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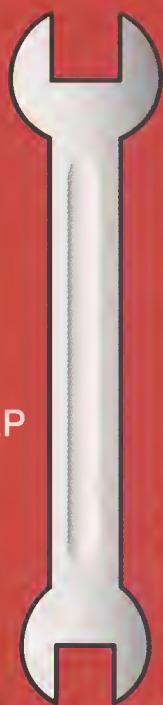
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BUILD YOUR OWN MP3 PLAYER



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SURROUND SOUND SPEAKER PLACEMENT

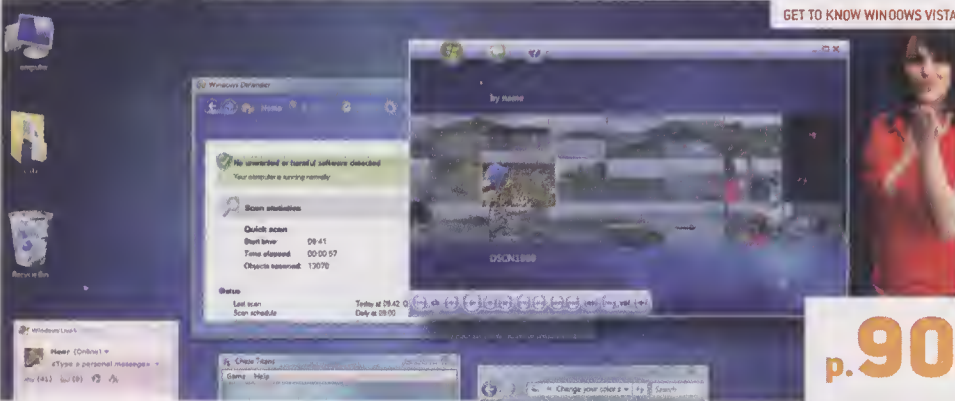


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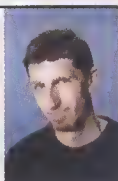


FINE-TUNE YOUR LCD MONITOR

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Letter From the Editor

"HECK, BY THE TIME YOU GET THROUGH WITH THESE PAGES, MAYBE YOU'LL EVEN LEARN SOMETHING!"



W e at PC Gamer get asked "how-to" questions all the time. "How do I pick out the best videocard?" "How do I add water cooling to my PC?" "How do I make my own level for (insert favorite game here)?"

In an effort to answer all of those questions and every other "how-to" query we could think of, we've compiled this magazine, a wall-to-wall book full of our best advice, solutions, and how-to guides.

Curious how to put together your own smokin' hot gaming rig from scratch? We've got you covered (page 35). Wondering how to position your surround sound speakers for optimal aural enjoyment? We're here for you (page 28). Itching to know what next year's Windows Vista OS is going to be like? We took a hands-on tour and brought back lots of pictures (page 90). Heck, we even thought you might like to know how to build your own MP3 player, so we tried it ourselves (page 50).

So sit back, relax, and get ready to have some fun. After all, isn't that what PC gaming is all about? Heck, by the time you get through with these pages, maybe you'll even learn something!

Ryan McCaffrey
Editor-in-Chief
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PC Gamer (ISSN-1080-4471) is published 13 times a year by Future US, Inc., 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Periodicals Postage Paid at South San Francisco, CA, and at additional mailing offices. Newsstand distribution is handled by the Curtis Circulation Company. Subscriptions: One year basic rate (12 issues): U.S.: \$29.95 Canada: \$49.95 Foreign: \$69.95. Canadian price includes postage and GST #R128220688. Outside U.S. and Canada: Add \$2.00 per issue. For customer service, write PC Gamer Customer Service, P.O. Box 5158, Harlan, IA 51593-0658, or call (800) 898-7159. Postmaster please send change of address to PC Gamer, P.O. Box 5158, Harlan, IA 51593-0658. Corporate, advertising sales, circulation, editorial and production offices: 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Phone: (650) 872-1642. Fax: (650) 872-2207. Editorial information should be addressed to Editor, PC Gamer, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Overnight delivery parcels should be addressed to PC Gamer, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Unsolicited manuscripts cannot be returned or acknowledged. Future US also publishes Maximum PC, MacAddict, Official Xbox Magazine, and PlayStation Magazine. Entire contents copyright 2006 Future US. All rights reserved. Reproduction in whole or in part without permission is prohibited. Reproduction on the Internet of the articles and pictures in this magazine is illegal without the prior written consent of PC Gamer. Game Players, Game Players Guide, and Game Players Encyclopedia are trademarks of Future US. Products named in these pages are trademarks or trademarks of their respective companies. Future US is not affiliated with the companies or products covered in PC Gamer. IPM# 0781118. Produced in U.S.A. Ride along Enclosure in the following edition[s]: C1, 01, 02, 03, 04, 05. Publications Mail Agreement #40043631. Returns: 4960-2 Walker Road, Windsor ON N9A 6J3.

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The Future Network plc is a public company quoted on the London Stock Exchange [symbol: FNET].

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REPRINTS: For reprints, contact Reprint Management Services, 717-399-1900, ext. 100.

SUBSCRIPTION QUERIES: Please visit www.pcgamer.com, email PCGcustserv@cdsfulfillment.com, call BDD 898-7159, or write to PC Gamer Customer Care, P.O. Box 5158, Harlan, IA 51593-0658.

How to Buy a Case

➤ Give your components a good home!

Though most people upgrade video-cards and hard drives on an annual basis, they rarely upgrade their PC case, unless tragedy strikes. The reason is simple: The ATX specification for cases has been around a long time, and it's still getting the job done. Simply put, there's usually little reason to upgrade unless you're looking for more room, more cooling or a more pleasing aesthetic. Indeed, these are the most important characteristics of a case: it must be able to hold all your hardware, and have enough fans to keep everything cool and relatively quiet.

CASE FANS: All cases include some sort of cooling system, though whether or not the actual fans are inside the case at the time of purchase varies. Regardless, every case has fan mounts, and it's important to see what

size they are prior to purchase. We typically favor large 12cm fans because they spin slowly, and therefore are relatively nice and quiet—and move a lot of air. You'll want to make sure there's a fan in the lower front of the case to suck air into the PC, and a nice, big fan in the back to blow it out. Some fans include exhaust fans on the top or side of the case, too, but these aren't always necessary and can add a lot of unwanted noise.

FORM FACTOR: The lion's share of consumer-level motherboards conform to the ATX specification, so make sure the case in question supports this standard (most do). Once you know it supports ATX, the only big question left is how big do you want to go? There's mid-tower cases, which are the size of what most consider to be a "regular" desktop, and there's full-tower cases, which are much

larger and longer than a mid-tower. Though their size makes them unsuitable for frequent transport to LAN parties, full-size towers are a breeze to work in given their cavernous interiors. They can also hold a lot of hardware, which is nice if you have several hard drives, are running SLI, or are thinking about investing in water cooling. For most users, however, a mid-tower will be more than sufficient.

FRONT-MOUNTED USB: This feature—having USB ports mounted on the front of the case for easy access—used to be a delicacy, but it is now almost standard fare. Still, pay attention to their location, as sometimes they're on the bottom-front of the case, and other cases put them right at the top, which is nice if your PC is resting on the floor. Some also offer front-mounted audio jacks and FireWire, which may be important to you.

Cooler Master Cavalier 1

This dreamy mid-tower is one of our favorites due to its elegant design, ample cooling, and tool-less interior. All optical and magnetic drives slide into their respective bays (and there's more than enough of them) and are fastened via simple sliding levers that lock the drives in place. Even PCI cards are attached snugly with a simple plastic lever. Cooling duties are handled by a 8cm fan up front and a 12cm fan in the back, which is fantastic. And the swing-out door that covers the front bezel can be tweaked to open from either direction, depending on whether your PC sits to your left or your right.



Thermaltake Armor VA8000SWA

Don't let this case's giant stature fool you. It's a full-size enclosure all right, but it's made entirely of aluminum and is therefore lighter than most mid-towers. It has a whopping 10 drive bays, including a removable three-drive bay with its very own LED-lit 12cm fan. You can even move the bay with the power switch and USB ports to any location you like. A huge, LED-lit 12cm-fan exhausts hot air out the back, and there's even pre-drilled holes in the back for a water-cooling setup. The best part? One of the drive bays is a pull-out tool holder!

"FAST-PACED TACTICAL STRATEGY IN REALISTIC BATTLES THAT COULD'VE BEEN RIPPED FROM THE HEADLINES." - GameSpot

21ST CENTURY WEAPONS FOR 21ST CENTURY WARS

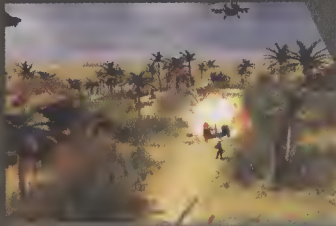
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How to Buy a Power Supply

➤ Don't overlook the importance of a good PSU!

The Power Supply Unit (PSU) is the Rodney Dangerfield of modern computing. Tucked away deep inside the PC case, it's rarely thought of, yet is one of the most important components in today's PCs. Think about it: What is on all the time, continuously providing all of your PC's greedy components with its much-needed power? The PSU, of course, and though they all look the same, there can be quite a difference between them. The bottom line though is that if you're willing to spend good money on high-end parts for your PC, the best investment you can make to ensure their long-term operation is to feed them power from a top-quality PSU.

WATTAGE RATING: This is the PSU's "big enchilada," as how many watts it's rated at determines how much juice it can provide to the components inside your rig. As a rule, every component requires some watts from

the PSU, so the more components you have, the more watts you're going to need. As a baseline, a standard one-videocard, one-hard-drive system can get by just fine with a 350W PSU, though super-loaded gaming rigs often require 500W-and-higher PSUs.

ATX CONNECTOR: Every PSU connects to your motherboard with a fat ATX power connector, but there has recently been an upgrade in this specification from a 20-pin connector to a 24-pin connector (dubbed ATX 2.0). Be sure to check what kind of connector is on your motherboard before plunking down cash for one. Also know that PCI Express-based videocards require a special power connector that is not found on older PSUs, so check for that as well.

DETACHABLE CABLES: In the old days, a PSU had a certain number of cables coming out of it, and if you didn't use two of them,

well, you just tucked them out of the way the best you could. Some of today's high-end PSUs are modular, though, in that each individual power cable is connected individually, so you only plug in what you need and leave the rest of the cables in the box. This is great, as it reduces case clutter considerably. The only problem is that by plugging the power cable into the PSU, you are creating a weak spot in the power line that could cause a problem at some point (though we've never experienced any problems with these types of connectors).

COOLING: All PSUs require some form of active cooling due to the amount of heat they generate. We prefer PSUs with large, slow-spinning 12cm fans because they provide adequate cooling without making a lot of noise. PSUs that use smaller 8cm or 9.2cm fans usually make more noise because the smaller fans have to spin at a higher speed to generate sufficient airflow.



Antec NeoPower 480

This sweet PSU has every next-gen connector available, includes modular cables, and didn't even flinch at our grueling stress tests. It sports an almost totally silent 12cm fan, which tickles our fancy, and its beautiful charcoal finish is classy. But more importantly, it provides tons of pure power—more than enough to fuel even the burliest gaming rigs. The icing on the cake is that it includes two fan-only power leads that dynamically adjust fan speed according to case temperature!

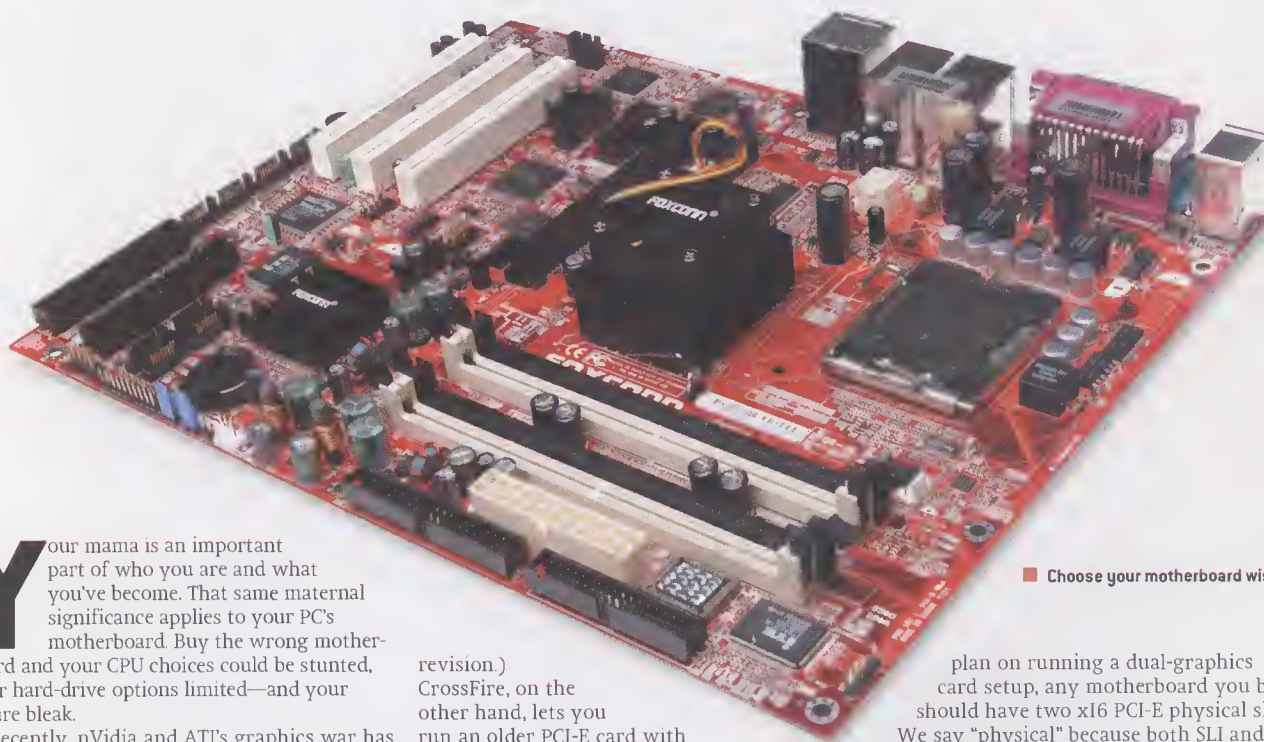
PC Power and Cooling Turbo-Cool 510 Deluxe

What it lacks in outright sex appeal, the PC Power and Cooling 510 Turbo more than makes up for in sheer performance. This sucker can handle anything you throw at it, and is the PSU we are currently using in all of our machines. It features sleeved cables, a very stout all-steel body, and lengthy cables that are perfect for full-size enclosures. It doesn't offer modular cables (PC Power and Cooling says they are less efficient than connected cables), but it makes up for it with power output that is always rock-steady regardless of how much stress we put on it!



How to Pick a Motherboard

➤ The Motherboard has become the most important choice you'll make when building or buying a new PC



■ Choose your motherboard wisely.

Your mama is an important part of who you are and what you've become. That same maternal significance applies to your PC's motherboard. Buy the wrong motherboard and your CPU choices could be stunted, your hard-drive options limited—and your future bleak.

Recently, nVidia and ATI's graphics war has elevated the motherboard to the most important component that you'll pick for your gaming PC. In the old days you could buy any motherboard and expect to run any graphics card that you wanted. Today, nVidia's and ATI's proprietary graphics standards are forcing PC users to make a choice. Pick an nVidia nForce4-equipped motherboard, for example, and you won't be able to run ATI's CrossFire dual-card technology. Buy a mobo with an ATI chipset (or an Intel chipset, for that matter), and you won't be able to run nVidia's SLI dual-videocard setup.

It's a maddening situation that doesn't look like it'll be resolved any time soon. All you can do is pick the graphics solution that impresses you the most and buy the motherboard/chipset combo that supports it.

SLI AND CROSSFIRE: If you want to build the ultimate gaming PC, you'll have to have dual graphics cards. nVidia's SLI, or Scalable Link Interface, requires an SLI-ready motherboard with two x16 PCI Express slots. SLI requires that the pair of videocards be the same make and model, and sometimes the same BIOS version. (nVidia says it will eliminate this requirement in a future driver

revision.) CrossFire, on the other hand, lets you run an older PCI-E card with a new CrossFire card. However, the system will always ratchet down to the lowest common denominator. If you, for example, run an older I2-pipe PCI-E card with 128MB of RAM, your shiny new CrossFire card will crank back from 16 pipes to 12 and cut its frame buffer from 256MB to 128MB. But on paper, ATI's technology looks stronger, as it should give you a performance boost in all games due to its tiled approach. Is it worth all

plan on running a dual-graphics card setup, any motherboard you buy should have two x16 PCI-E physical slots.

We say "physical" because both SLI and CrossFire actually can only support a pair of x8 data rates in consumer motherboards. If you never plan on buying dual graphics cards, then all you really need is a single x16 PCI-E slot and probably an additional x1 PCI-E slot. Don't be worried if the board doesn't have more than one x1 slot. In our opinion, the move to PCI-E is going so slow that other technologies will make it obsolete, not a lack of PCI-E slots.

In the old days you could buy any motherboard and expect to run any graphics card that you wanted. Today, nVidia's and ATI's proprietary graphics standards are forcing PC users to make a choice.

the fuss? Hellz yeah. With an SLI rig you can, for example, comfortably play *Half-Life 2* at 100fps with 4x AA and 8x anisotropic filtering at I600x1200.

PCI EXPRESS: PCI-E has all but supplanted AGP when it comes to new machines. You'll hear grouching that AGP is still good enough, but ATI and nVidia have moved on. In fact, nVidia said it has no plans to offer an AGP version of its GeForce 7800GTX cards. If you

And frankly, we haven't seen any compelling uses for add-in PCI-E cards besides graphics, and hardware vendors are telling us that x1 is just too slow to be useful today because of latency issues. Sure, an x1 PCI-E slot offers more than double the data rates of an old PCI slot. However, with most vendors saying that it'll take x4 PCI-E before we see worthwhile performance improvements, we say don't worry if the mobo doesn't have more than one x1 PCI-E slot.

ULTIMATE M6 SNIPER



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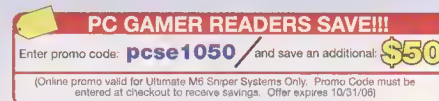


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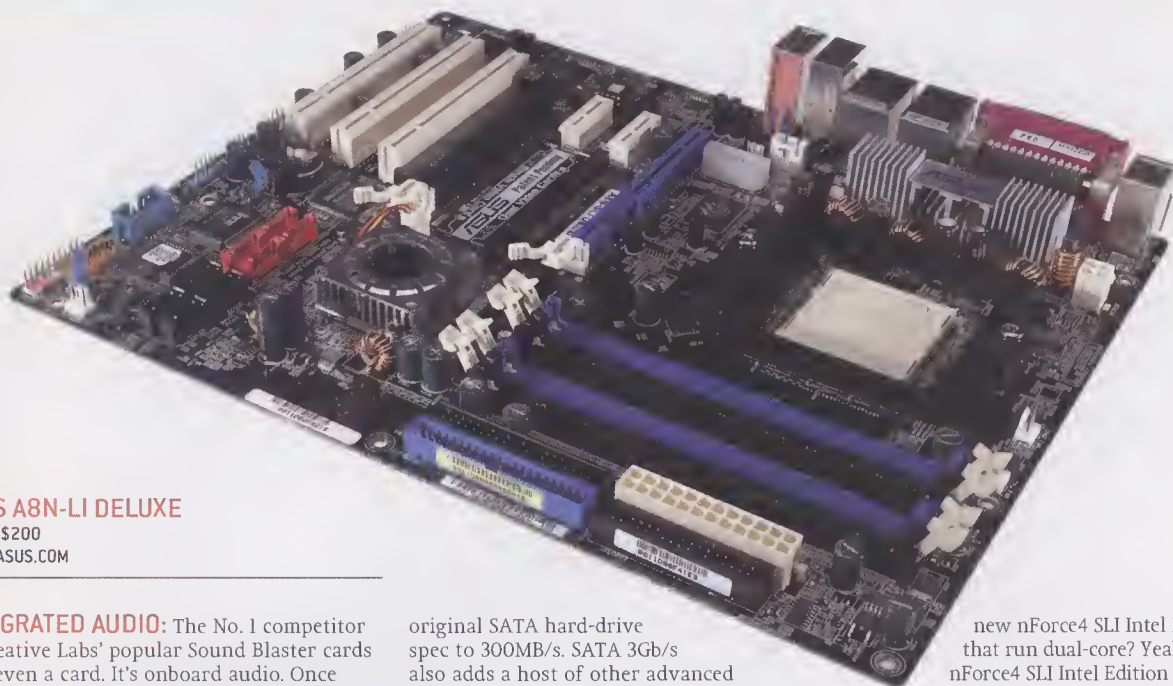
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INTEGRATED AUDIO: The No. 1 competitor to Creative Labs' popular Sound Blaster cards isn't even a card. It's onboard audio. Once thought of with extreme disdain, onboard audio has become rather respectable. Intel's HD Audio spec for Pentium 4 motherboards has even pushed onboard audio to 24-bit capabilities with the ability to use the CPU to take the surround-sound audio and convert it for use with a living room Dolby Digital deck—in real time.

So is onboard audio the end of sound-cards? We say no. Even though HD Audio specs 24-bit components, the fact that they're mounted on a motherboard—the equivalent of an electrical noise storm—means onboard audio still isn't better than an add-in sound-card. However, all but the most astute listeners will not perceive a difference in audio quality between onboard and add-in audio.

We like the HD Audio spec and think it's valuable to have. One warning, though: not

original SATA hard-drive spec to 300MB/s. SATA 3Gb/s also adds a host of other advanced features such as native command queuing (NCQ), which intelligently reorders data as it is read from the hard drive for higher performance; and port-multiplying technology, which lets you tack on more SATA ports. For the most part, SATA 3Gb/s is a technology that doesn't help gaming because today's hard drives aren't fast enough. And NCQ really only benefits highly randomized reads from the hard drive, such as server applications. However, since there's no real additional cost for SATA 3Gb/s (the latest Intel and AMD chipsets support it), it doesn't make sense to not get it.

FRONT-SIDE BUS: The speed of the mobo's front-side bus really only matters with Intel processors because AMD chips integrate the memory controller in the CPU. For Intel,

new nForce4 SLI Intel Edition: Can't that run dual-core? Yeah, sorta. Only nForce4 SLI Intel Edition boards certified by the individual motherboard vendors can run some dual-core procs. For some odd reason, which we suspect is related to the intense rivalry between Intel and nVidia, the NF4 will not support the 2.8GHz Pentium D 820 processor. The whole situation just stinks. The key when selecting a dual-core board on the Intel side is to be very picky about what you want and to plan ahead.

THE CHIPSET: The core-logic chipset is the brains of any motherboard and is the most important component on the motherboard. It'll dictate whether you can run dual-core (see above) and SLI, and what level of SATA drives you can run. It also has a huge impact on the performance of the motherboard. For space reasons, we can't expound on the intricacies of every chipset, but here's what we recommend: nForce4 SLI or nForce4 Ultra for AMD applications and Intel's 955X or nForce4 SLI Intel Edition chipsets.

For some odd reason, which we suspect is related to the intense rivalry between Intel and nVidia, the NF4 will not support the 2.8GHz Pentium D 820 processor. The whole situation just stinks.

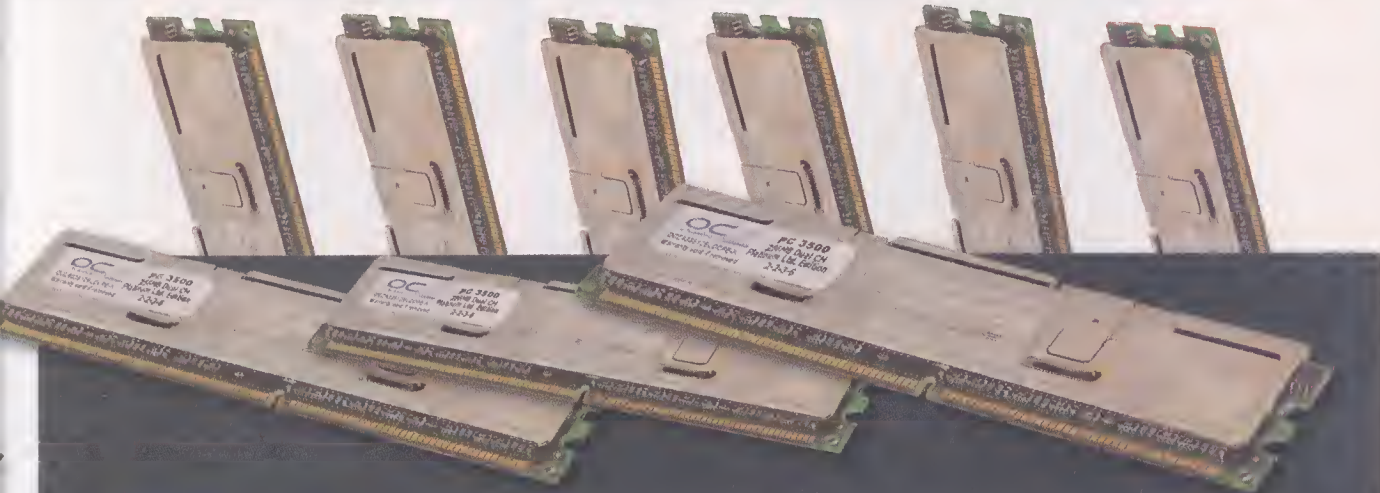
all motherboard vendors support the Dolby Digital Live portion, which is what you'll need to use your PC with a living-room surround-sound speaker system. If you intend to build a PC for your living room, you'll want to make sure you choose a motherboard with Dolby Digital Live support. Of course, that applies only to Intel-based motherboards. The majority of Athlon 64 motherboards still use 16-bit parts, and nVidia has even told us there was no demand for higher-resolution components so it didn't add the support to its latest chipsets. For Athlon 64 boards, we recommend a good sound card.

SATA 3GB/S: When you build a city, you don't wait for massive traffic jams before you build roads—you expand the roads before the gridlock occurs. SATA 3Gb/s does that by doubling the data rates of the

we think the minimum speed a new mobo should support is 1,066MHz. There's currently only one production processor that supports it: the 3.73GHz P4 Extreme Edition. However, we suspect that Intel plans to offer more chips that support the faster front-side bus spec. So, it's just plain smart to get a board that supports it.

DUAL-CORE SUPPORT: If you're shopping for an AMD board, all you need to know about any potential motherboard is whether it has the ability to run an Athlon 64 FX-55 CPU. If it does, you can run dual-core. Done. Fini. Over. For Intel, it's a little more complicated... The 925XE chipset that Intel introduced early this year cannot, for example, support dual-core. Only motherboards using the 945 and 955X series are fully qualified to run all of Intel's dual-core procs. Ahh, but what about nVidia's

BTX: Intel's push for the Balanced Technology eXtended specification is the first overhaul of desktop form factors since the nearly decade-old ATX spec debuted. It dictates a number of changes that make sense for today's—and tomorrow's—faster PCs, such as relocating the CPU to the front of the motherboard so a single fan can suck fresh, cool air in the front of a case and blow it over the processor, video card, and chipset. It also moves the south-bridge chip—which controls the hard drive, DVD drives, and USB ports—closer to the rear of the PC, where most of the high-speed I/O is going on these days. In short, BTX will let companies build cooler, quieter, and faster PCs. It's also pretty meaningless today because it's only being used by large PC vendors. Motherboard and case manufacturers are taking a pass for now because they don't see any need to convert. It'll take a while for BTX to go anywhere, and in the meantime, ATX will continue to thrive. So, when buying your motherboard, don't make BTX a "must have."



What About RAM?

RAM decisions have been relatively simple to make for a while now, but the technology will soon be coming to a cross-roads. DDR2 memory, the sequel to the current DDR spec, has been slowly building momentum since its introduction last year. Early samples running at 400MHz and 533MHz didn't rock anybody's world—there was little perceptible performance gain over standard DDR. However, the latest 667MHz and 800MHz versions are starting to turn some heads. Right now, AMD's camp doesn't have to worry about it because Athlon 64 chips are incompatible with DDR2 due to the on-die memory controller. Since DDR2 hasn't really offered much of a performance increase yet, we'd say it's not really worth worrying 'bout. For Intel users, it's also a foregone conclusion because the best gaming motherboards on the market are DDR2-only. DDR on the Intel platform has been mostly relegated to the budget crowd. So, if you're building AMD, don't worry about DDR2. If you're building an Intel box, make sure your motherboard supports, at a minimum, the DDR2/667 speed. And make sure you have at least 1GB of RAM in your gaming rig, preferably 2GB — we're starting to see games, such as *Battlefield 2*, which will benefit greatly from the extra "room." For more on RAM, turn to page 18.

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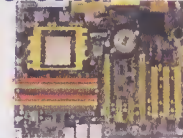
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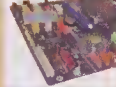
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How to Buy a Hard Drive

➤ Do you really need to spring for 10,000 rpms?

Hard drives have improved leaps and bounds in the last few years, and while a super-fast drive won't improve your frame rate at all, it can certainly help levels load faster and provide more than enough space for all your games, MP3s, and more. The most important features to consider when shopping for a gaming drive are storage capacity, buffer size, and rotational speed.

BUFFER: Every hard drive has a tiny bit of onboard memory that is known as the buffer or cache. When data is retrieved from the platters it is put into the cache so that if after you close something that you just retrieved (say, a Word document) and you suddenly decide you need to open it again, the document can be read directly from the cache. This saves the drive's read/write heads from needing to go all the way back to where the file was on the platter to read it again. This saves a lot of time, as data can be retrieved

from memory almost instantly. A general rule with buffer size is the bigger, the better. Today's minimum is 8MB, and several high-end drives now ship with 16MB buffers.

CAPACITY: Like cache, the general rule with capacity is also the bigger, the better. Though everyone's size requirements are different, we find a safe rule of thumb is 250GB as the minimum for a high-end gaming machine. Drives are available today in sizes ranging from 80GB all the way up to 500GB, so it's generally true that drives in the 200GB to 250GB range are in the "sweet spot" in terms of price and capacity. As an example, a 500GB drive is \$500, so it's \$1 per gigabyte, but 250GB drives are only \$120, which is \$0.48 per gigabyte.

INTERFACE: There are two interfaces available for hard drives, and there's not much difference between them in terms of performance, so when deciding which is right for you the primary consideration should be

what type of ports your motherboard offers. The standard interface is called Parallel ATA (also known as ATA or Ultra ATA). This interface uses a 40-pin connector with wide, flat ribbon cables; has been around for quite some time now; and is found on all motherboards. The parallel interface is currently being phased out in favor of a newer, faster interface named Serial ATA, which uses thin cables. SATA's benefits include the fact that you don't have to set jumpers (which is required with ATA devices), and that its smaller cables don't inhibit airflow as much as the archaic ATA cables.

ROTATIONAL SPEED: Because hard drives operate by rotating a platter underneath a pair of read/write heads to retrieve data, the faster the platters spin, the less time you spend waiting for data to be retrieved. The most common rotational speed for consumer-level hard drives is 7,200rpm, which is the minimum you should accept in a gaming drive.

Maxtor DiamondMax 10

The DiamondMax 10 is our favorite 7,200rpm drive because it's super-fast, quite spacious at 300GB, and runs cool and quiet at all times. There are bigger drives out now that are 400GB and 500GB, but they are expensive, and not quite as fast as the DiamondMax in some benchmarks. The drive's superior speed is due to its hefty 16MB buffer and reasonably high platter density (it uses three 100GB platters). We've been using DiamondMax 10 drives in our zero point test beds in the Lab, and they've been serving us faithfully for the better part of this year.

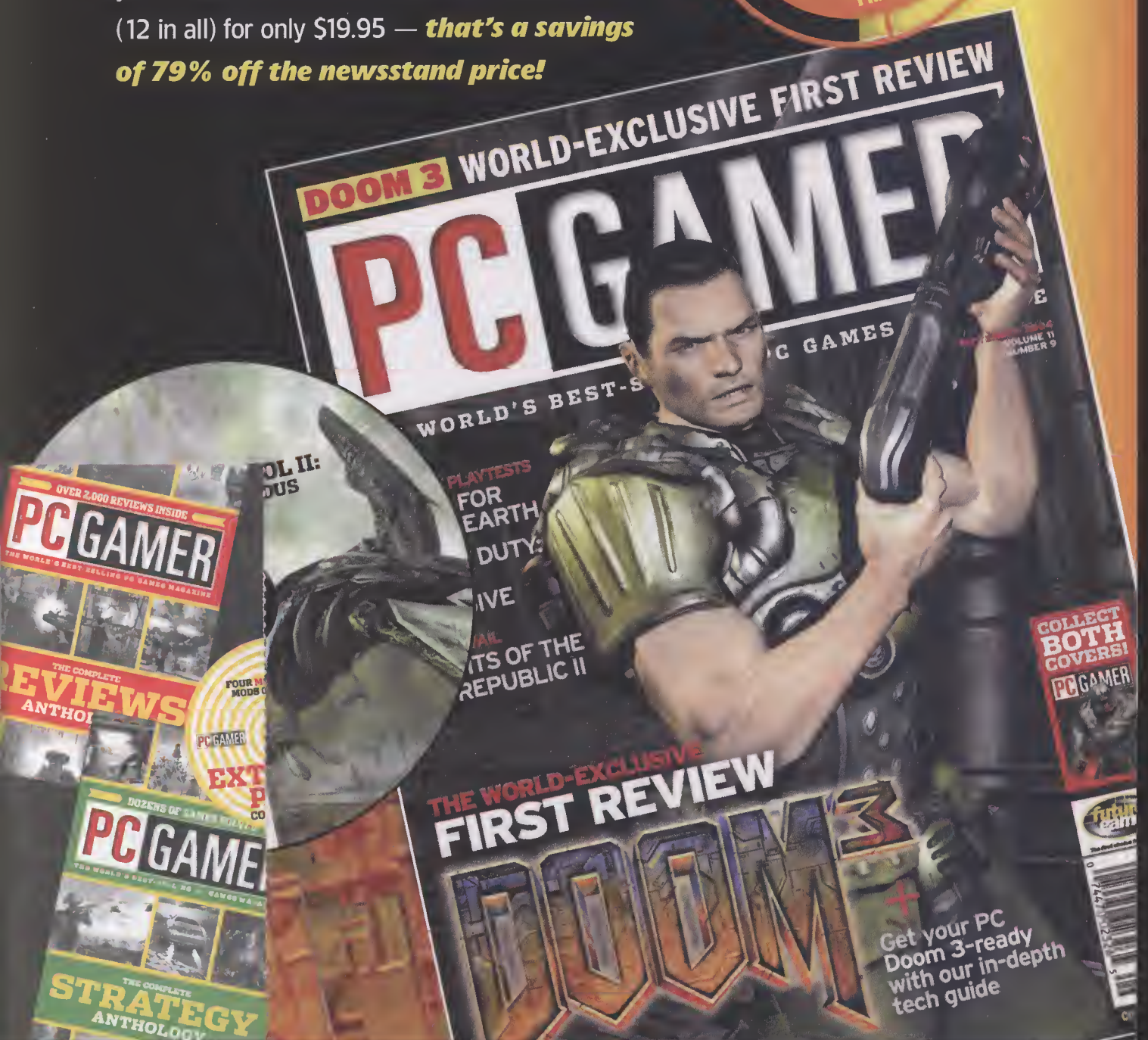


Western Digital Raptor 740GD

The 74GB Raptor is the fastest desktop drive around in most benchmarks, mostly due to the fact that it's the only Serial ATA drive on the market with a 10,000rpm rotational speed (every other SATA drive spins at 7,200rpm). Its 4ms average seek time is roughly twice as fast as what you get with a 7,200rpm drive, and it's the real deal. Raptor drives feel incredibly responsive and fast, even when doing mundane desktop work. The only caveat is its 74GB capacity, which is rather small. But given its ultra-fast seek times, the Raptor is a must-have if all-out performance is more important to you than capacity.

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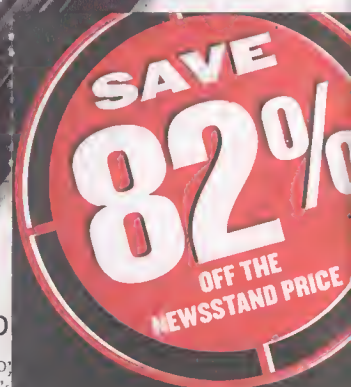
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Understand Your RAM

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Access to data in RAM is immediate: The CPU can read or write to any location in memory without having to muddle through the adjoining data.

Most RAM used in PCs today is dynamic RAM, or DRAM. It's called "dynamic" because the memory chips must receive new electri-

cal charges (a process known as memory refreshing) thousands of times a second, or the data stored in the chips is lost. This is why information saved only in RAM is lost as soon as your PC is restarted or turned off.

RAM AND PAGING FILES

If a program or data file is too large to completely reside in RAM, PCs use dedicated areas of the hard disk to store the overflow. This dedicated disk space is known as "virtual memory." The paging file (swapfile) in Windows is an example of virtual memory. Windows uses the paging file as a holding tank for information being transferred in and out of your system RAM. The less RAM you have, the more frequently your paging file is used.

Although a paging file enables a system with a relatively small amount of memory to work with files that exceed the amount of

available physical memory, using the paging file instead of physical memory has a huge negative impact on performance. Hard drives move data an order of magnitude slower than even the slowest RAM.

This means that the more memory you add to your system, the greater the number of programs you can run, and your system can work with larger files before resorting to the paging file. In an ideal situation, the paging file would never be used. In practical terms, you want to install enough memory to handle the largest amount of work (or play) your PC performs on a routine basis.



RAM TODAY'S WAY

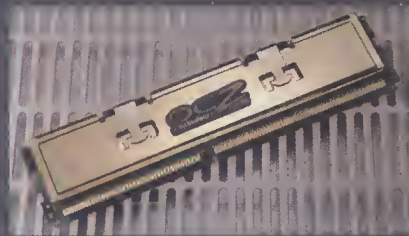
There are two types of RAM used in today's PCs: DDR (double data-rate) and DDR2 (second-generation DDR). These memory types are usually synchronized to the processor's front-side bus (FSB) speed, as was their ancestor, SDRAM memory. Both DDR and DDR2 provide faster performance than SDRAM because they run at much higher clock speeds, and transfer twice the amount of data every clock cycle as vanilla SDRAM was capable of. Despite the similar names, DDR and DDR2 are not compatible with each other and cannot be interchanged.

UNDERSTANDING DDR NOMENCLATURE

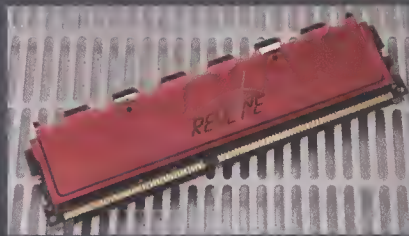
The naming scheme for DDR memory can be very confusing. How do you know if you have DDR400, 200MHz DDR memory, or PC3200 DDR SDRAM? The trick is, it's all the same memory. Because DDR400 runs at a clock speed of 200MHz but makes

two reads or writes per clock cycle, the effective speed of the memory is 400MHz. People also refer to DDR memory by its throughput. For example, DDR400 memory has a maximum throughput of 3,200MB/s, so memory modules using DDR400 RAM are also called PC3200 modules. The most common DDR memory speeds are shown in Table 1 on page 20. Speeds above PC4000 are used primarily by extremely high-performance, over-clocked systems.

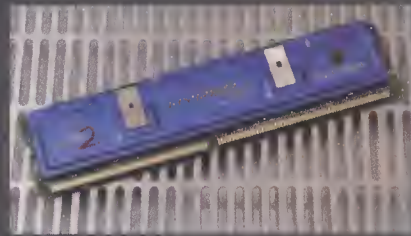
Aside from the PC rating, the other factor that's important when you select DDR memory is the rated CAS (column, address, strobe) latency. CAS latency (often abbreviated as CL) refers to the number of clock cycles needed to access the memory. Most DDR memory has a CL rating of 2.5 or 3. Lower-latency modules running at the same clock speed as higher-latency modules provide faster memory access.



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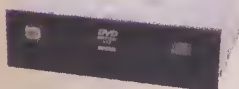
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DDR vs. DDR2: How do they compare?

The latest Intel chipsets for the Pentium 4 use DDR2 memory—second-generation DDR memory. Compared with DDR memory, DDR2 runs at lower voltages to reduce heat, boasts larger-capacity chips to permit higher memory capacities per DIMM module, and uses other design tricks to run at faster clock speeds, as shown in Table 2. However, as DDR2 memory speeds increase, their latency also goes up. Thus, you shouldn't expect a DDR2 system running PC2-3200 (DDR2 400) to be much faster than a comparably equipped system running PC3200 (DDR400) memory. The true benefits of DDR2's comparably higher clock-speeds has already begun to show up in newer motherboards. Make sure to check what speed and type of RAM your board supports before you make your purchase.

Table 1: Common DDR Memory Speeds

PC RATING	THROUGHPUT	DDR RATING (EFFECTIVE CLOCK SPEED)	ACTUAL CLOCK SPEED
PC1600	1.6GB/s	DDR200	100MHz
PC2100	2.1GB/s	DDR266	133MHz
PC2700	2.7GB/s	DDR333	166MHz
PC3200	3.2GB/s	DDR400	200MHz
PC3700	3.7GB/s	DDR466	233MHz
PC4000	4.0GB/s	DDR500	250MHz
PC4400	4.4GB/s	DDR550	275MHz
PC4800	4.8GB/s	DDR600	300MHz
PC5600	5.6GB/s	DDR700	350MHz

Table 2: Common DDR2 Memory Speeds

PC RATING	THROUGHPUT	DDR2 RATING (EFFECTIVE CLOCK SPEED)	ACTUAL CLOCK SPEED
PC2-3200	3.2GB/s	DDR2 400	200MHz
PC2-4300	4.2GB/s	DDR2 533	266MHz
PC2-5400	5.6GB/s	DDR2 667	333MHz
PC2-6400	6.4GB/s	DDR2 800	400MHz

The Complete Guide to Choosing the Right Ram

Maybe you don't want to know the details—you just want to find out what kind of RAM you need and get on with your life. Here's a guide to pairing the correct type of RAM with your motherboard and chipset.

Athlon XP RAM Guide

ATHLON XP MODEL NUMBER	PROCESSOR FSB	MEMORY
1500+ 1600+ 1700+ 1800+ 1900+ 2000+ 2100+ 2200+ 2400+ 2600+**	266MHz	DDR PC2100
2500+ 2600+** 2700+ 2800+ 3000+***	333MHz	DDR PC2700
3000+*** 3200+ and higher	400MHz FSB	DDR PC3200

**Some 2600+ run at 266MHz FSB, while others run at 333MHz FSB.

***Some 3000+ run at 333MHz FSB, while others run at 400MHz FSB.

Athlon 64 and FX RAM Guide

ATHLON 64/FX SOCKET TYPE	MEMORY
Socket 940	Registered dual-channel DDR PC1600, PC2100, PC3200*
Socket 939	Dual-channel DDR PC1600, PC2100, PC3200*
Socket 754	Single-channel DDR PC1600, PC2100, PC3200*

*Memory configurations might differ with CPU due to on-die memory controller.

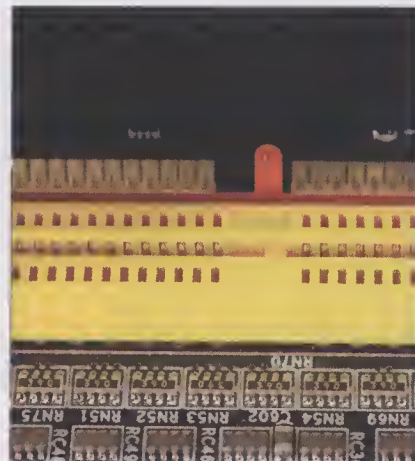
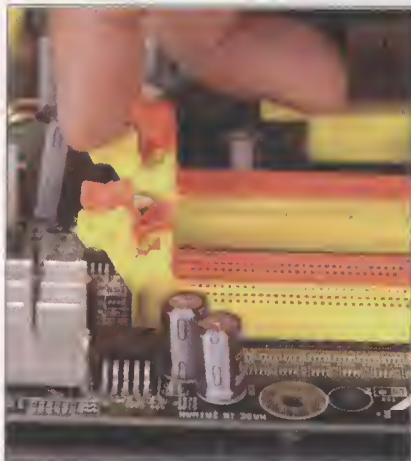
Pentium 4 RAM Guide

SOCKET TYPE	CHIPSET	MEMORY
INTEL CHIPSETS		
Socket 423	850, 850E	Rambus RDRAM
Socket 478	845, 845G, 845GV, 845GL	PC-133 SDRAM or DDR PC2100/PC1600*
	845GV	PC-133 SDRAM or DDR PC2700/2100/1600*
	845GE, 845PE	DDR PC2700/2100
	848P	DDR PC3200/2700/2100
	865G, 865PE, 865GV	Dual-channel DDR PC3200/2700/2100
	865P	Dual-channel DDR PC2700/2100
	875P	Dual-channel DDR PC3200/2700/2100
Socket 478, Socket 775	910GL	Dual-channel DDR PC3200/2700
Socket 775	915GL	Dual-channel DDR PC3200/2700
	915GV, 915P, 915G	Dual-channel DDR PC3200/2700 or dual-channel DDR2 PC-4200/3200*
	925X, 925XE	Dual-channel DDR2 PC-4200/3200
	915PL	DDR PC3200/2700
	955X	Dual-channel DDR2 PC2-5300/4200
VIA CHIPSETS		
Socket 478	P4X266, P4X266E, P4M266	PC-133/100 SDRAM or DDR PC2100/1600*
	ProSavage P4M266	DDR PC2700/2100
	P4X400	DDR PC2700/2100/1600
	PM800	DDR PC3200/2700/2100
Socket 478, Socket 775	PT880 Pro, PT880 Ultra, PT894, PT894 Pro	Dual-channel DDR PC3200/2700/2100 or dual-channel DDR2 PC-4200/3200*
	P4M800 Pro	DDR PC3200/2700/2100 or DDR2 PC2-4200/3200*
NVIDIA CHIPSET		
Socket 775	nForce4 SLI Intel Edition	Dual-channel DDR2 PC2-5300/4200/3200

*Check motherboard to determine which memory type your system supports. You can also use system-analysis programs such as SiSoftware Sandra 2005 Lite (www.sisoftware.co.uk/) to determine this information.

INSTALLING RAM THE RIGHT WAY

RAM is fragile—not so much physically as electronically. During the installation process, it's essential to protect it from electrostatic discharge (ESD), better known as static electricity. Keep your memory in the antistatic packaging until it's time to install it.



1 Before you remove the memory from its packaging, make sure the memory locking levers are in the open position. You cannot insert memory into a socket if the clips are closed.

2 Before you insert the memory into the socket, make sure the memory is oriented correctly. The notch in the memory must line up with the key in the socket. Slide the memory into the grooves of the locking levers.

3 Some downward pressure is required to install the memory, but don't force the memory too much. The clips should swing from the open to the closed position as the memory is inserted. If the clips do not swing closed as you push the memory into place, the memory is probably not oriented properly.

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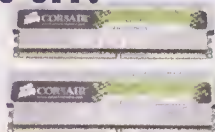


OCZ Value 1GB
200-Pin OOR2 SO-DIMM
DDR2 667 (PC2 5400)
Notebook Memory

PCG2MM1

Search: 20-227-099

\$10 OFF!



CORSAIR XMS2 2GB (2 x 1GB)
240-Pin DDR2 SDRAM
DDR2 800 (PC2 6400)
Dual Channel Kit
System Memory

PCG2MM2

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\$15 OFF!

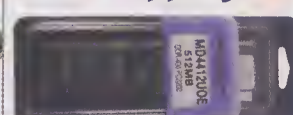


Mushkin 2GB (2 x 1GB)
240-Pin OOR2 SDRAM
DDR2 800 (PC2 6400)
Dual Channel Kit
System Memory

PCG2MM3

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Free Shipping!



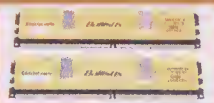
pqi POWER Series 512MB
184-Pin OOR SDRAM
DDR 400 (PC 3200)
Unbuffered System
Memory

PCG2MM4

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Crucial Technology Ballistix 2GB (2 x 1GB)
240-Pin OOR2 SDRAM
DDR2 1000 (PC2 8000)
Dual Channel Kit System Memory



PCG2MM5

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\$15 OFF!

Crucial Technology Ballistix 2GB (2 x 1GB)
240-Pin DDR2 SDRAM
DDR2 800 (PC2 6400)
Dual Channel Kit System Memory



PCG2MM6

Search: 20-146-565

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■ To enjoy HDR lighting, and other goodies, you'll need a good GPU.

How to Pick a Videocard

► Prepare yourself for the future of SLI

Millions of vertices per second? Fill rates of billions of pixels per second? Don't fall victim to a specifications snow job. We'll show you which videocard features and statistics really matter.

GPU: The acronym stands for "graphics processing unit," which is the integrated circuit responsible for handling 2D and 3D graphics, as well as video. It is the single most important component on any videocard. When it comes to PC games (and videogame consoles, too, for that matter), two manufacturers have pretty much divided the market between themselves: ATI and nVidia.

BUS INTERFACE: Your motherboard's expansion bus will have one of two types of videocard slots: AGP or PCI Express. AGP (Accelerated Graphics Port) is the older and

slower of the two standards (AGP 8x offers maximum bandwidth of 2.1GB/sec, compared to 8GB/sec for a 16-lane PCI Express), and it looks as though ATI and nVidia don't plan to support AGP with their newest parts. What's more, neither manufacturer's dual-GPU technologies support AGP. But if you're not ready to upgrade your motherboard, you'll need to buy an AGP videocard.

If your motherboard does have PCI Express slots, you absolutely should buy a videocard with a PCI Express interface. PCI Express is a bi-directional serial protocol that's much faster than AGP. Each device on the PCI Express bus has its own dedicated "highway," and each of these highways can be 1, 2, 4, 8, 16, or 32 lanes wide. Although current motherboards support only 16 PCI Express lanes for graphics, the bandwidth available in such a configuration is roughly double that from an AGP slot.

PIXEL PIPELINES: GPUs (a.k.a. graphics processing units) create images by processing pixels in parallel pipelines. The more pixel pipelines a GPU has, the faster it will be capable of rendering an image. Everything else being equal, a GPU with 24 pixel pipelines will be faster and more powerful than one with 16 pipes; a 16-pipe GPU will be faster and more powerful than a 12-pipe GPU, and so on.

CORE CLOCK SPEED: In a discussion of videocards, the word "core" refers to the videocard's GPU. Core clock speed measures how fast the GPU is set to operate and is stated in megahertz (MHz), or millions of cycles per second. Generally speaking, a faster core clock speed will translate to faster performance within a given GPU series. Comparing Radeon-series clock speeds to GeForce-series

BUDGET



6600GT
PRICE: \$200
3D MARK D5: 3,950
HALD (FPS): 48.0

HIGH-END



X800XL
PRICE: \$500
3D MARK D5: 5,536
HALD (FPS): 71.1



7800GTX
PRICE: \$600
3D MARK D5: 8,054
HALD (FPS): 107.9

clock speeds, on the other hand, is not necessarily a reliable measure of performance.

MEMORY: Videocards can be equipped with different types of memory in different quantities. The amount of memory on the videocard helps determine the maximum resolution the card is capable of displaying. Budget videocards are generally equipped with 128MB of memory, but 256MB is the sweet spot. A few manufacturers are offering higher-end boards with 512MB, but at press time, those bad boys were still very bad news for our wallets..

MEMORY CLOCK SPEED: This specification measures how fast the videocard's memory is set to operate and is stated in megahertz (MHz) or millions of cycles per second. This spec can be confusing because some videocard manufacturers publish clock-speed specs while others promote "effective" clock speeds (even though they don't always label their spec that way). Allow us to explain: Nearly all videocards are outfitted with some flavor of DDR RAM (DDR is an acronym for "double data rate"). DDR memory is capable of transferring data on both the rising and falling edges of the clock signal; DDR RAM clocked at 500MHz, therefore, has an effective clock speed of 1GHz.

DDR2 RAM and DDR3 RAM operate on this same principle, but these types of memory are capable of higher clock speeds. GDDR3

RAM, meanwhile, is a double-data-rate memory designed specifically for videocard applications. It requires less power and generates less heat than DDR RAM.

MEMORY INTERFACE: The wider the connection between the videocard's GPU and its memory, the faster the GPU can process data. Budget videocards typically have a 128-bit interface to memory, while higher-end cards usually have a 256-bit interface.

DISPLAY INTERFACE: Videocards have up to three types of connectors for connecting a display: DVI, VGA, or TV-Out. DVI (the acronym stands for Digital Visual Interface) is an Intel-developed standard for connecting a digital display, such as an LCD. VGA (the acronym ostensibly stands for Video Graphics Array, but the term is now widely used to describe any analog computer video signal or connector) connects an analog computer display. TV-Out, as its name implies, outputs an analog video signal compatible with consumer televisions, VCRs, and the like.

Most videocards have at least one DVI port and one analog VGA port. High-end cards offer dual DVI ports, so you can run two flat-panel displays in digital mode, but you can connect either type of computer display to either connector using an adapter. Cards that support TV-Out usually provide a breakout cable with connectors for composite, S-Video, and—in some cases—component video.

VIVO: The acronym stands for video-in/video-out, and it describes a port on the videocard that can both accept and produce a TV-compatible analog video signal. Videocards with VIVO ports can digitize analog video in real time, which makes them suitable for nonlinear video editing.

DIRECT-X: This is a collection of APIs (application program interfaces) developed by Microsoft to simplify game development and eliminate hardware/software compatibility issues with the company's Windows operating system. As of this writing, DirectX 9.0c was the most current version. DirectX support is ubiquitous in games, but make sure the card you're considering supports the latest version.

SHADER MODEL 3.0: This is a composite label for two components of Microsoft's DirectX technology: Pixel Shader Model 3.0 and Vertex Shader Model 3.0, which enable game developers to create more complex and realistic environments while simultaneously reducing CPU and memory overhead.

The limited numbers of games that currently utilize Shader Model 3.0 will revert to an earlier shader model when run on a GPU that doesn't support the new standard. nVidia's GeForce 6- and 7-series GPUs support Shader Model 3.0 now. ATI's R520 supports the technology too.

AVIATOR. MODERN TECHNOLOGY. CLASSIC DESIGN



With its realistic feel and authentic design, the new **Saitek Aviator** puts you in control of the most thrilling flying experiences ever. Whether you're patrolling the channel or landing a bush plane somewhere in the wilds of Alaska, the **Aviator** gives you unprecedented command over every situation. Sculpted by engineers and molded by artists, the aviator propels classic aviation into the 21st century. So as you prepare to embark on your next adventure, put the **Aviator** into your cockpit and head for the clouds..

- Dual independent throttle controls with interlock
- Realistic design trigger
- 8-way D-Pad
- 11 buttons
- Roll-tilt-twist
- Constant force spring gimbal design
- Fully programmable with over 24 commands
- Ambidextrous
- Compatible with Windows 2000, XP, XP64

How to Buy an Optical Drive

➤ Rip, burn, repeat—faster than ever before!

Optical drives are so cheap these days that they may as well be sold in subway vending machines. Even the least expensive drives are of fairly good quality and are often bundled with software that's sold separately for more than the price of the drive itself!

But there's good reason to shell out a few extra bucks for a premium drive—the primary one being, naturally, sheer speed. If you install a lot of games on your PC, then an optical drive with a fast read speed (at least 32x for CDs and 8x for DVDs) can shave minutes off the time it takes to install a massive game like *Dungeon Siege 2*. Another reason is that many top-shelf optical drives use homebrew technologies to reduce drive noise, such as the vibration control mecha-

nism in Samsung's TS-H552U (\$75, www.samsung.com).

Double-layer recording isn't exactly driving the crowds wild just yet. Despite holding 8.5GB of video or data versus 4.7GB on a traditional recordable DVD, double-layer discs remain expensive (still hovering around \$10 each), and the desire for the technology simply isn't there—yet. We think double-layer recording will really bust out once the media falls below \$4: combine the generous capacity of double-layer discs with high-quality video-compression technology (like DivX 6), and you've got a very cheap alternative to recording large amounts of video (even high-definition video) without importing a Japanese \$3,000 DVD burner that uses blue laser technology.

DUAL-FORMAT DISGRACE

The first wave of DVD burners used one of two leading formats: DVD-R or DVD+R. The folks behind each standard salivated at the prospect of pocketing a few cents for every single disc sold (as Philips does with its patented Compact Disc), and refused to negotiate toward a single, consumer-friendly standard. They chose instead to push manufacturers to adopt one or the other, and the result is that manufacturers and resellers suffered extremely high return rates as consumers bought DVD-R drives and tried to use them with DVD+R media (or vice-versa), and assumed the drive was defective when the combination didn't work. That's why virtually every optical drive sold today supports both formats.



PlexWriter PX-716A DVD Burner

Reading from CDs at 32x and from DVDs at a blazing 16x, the PX-716A is a gamer's best friend. And we're not at all surprised that the PX-716A turned in a record-breaking time writing 4.25GB to a single-layer DVD+R disc in 5:50 (min:sec); we're accustomed to cutting-edge speeds from Plextor. What really amazes us is the unprecedented speed with which the PX-716A writes to double-layer media. The 716A broke the 20-minute barrier writing 8.3GB of data to a DVD+R DL disc in just 18:16 (min:sec), which it did by writing at 6x to media rated for 2.4x speed! And the icing on the cake is the bundled *Easy Media Creator 7* suite.

Western Digital Raptor 740GD

Gamers won't be disappointed with read speeds of 48x from CDs and 8x from DVDs, but what makes BenQ's DVD ReWriter really unique is the LightScribe technology licensed from the gnomes at HP, which modulates the strength of the burning laser to etch a gray-scale image onto a special dye coating on the label side of a LightScribe disc.

Burning a complex image at maximum quality can take a long time and the results are very low-contrast, but the detail is very impressive—we could even see the whiskers on a photograph of a cat, and 10-point italicized white type came out easily legible. The ReWriter will even burn your track list on an audio CD—all you have to do is flip the disc. The drive isn't just about LightScribe, though: BenQ set a record burning 4.25GB to a 16x single-layer recordable DVD+R with a time of 5:41. And it comes with *Nero Express*.



How to Buy a Soundcard

➤ Every mobo has onboard sound. So do you really need a soundcard as well?

The simple answer... is yes. At least if you value luxury sound, and especially if it's for a Media Center PC, or you want the most immersive in-game audio you can possibly hear. Onboard sound chips (made by various companies such as Realtek and Creative) may offer 5.1 and even 7.1 setups directly from your motherboard, but this technology tends to be several generations out of date and simply can't offer the number of post-processing effects that a dedicated soundcard boasts. The only company pumping real money into soundcard research these days, though, is Creative, whose new X-Fi soundcard range is simply the bee's knees. If you're after the best sound possible, there's simply no alternative. The cards feature some amazing effects, not least the Crystallize function, which makes audio richer and sharper. X-Fi is also very good at creating 3D sound in a two-speaker or headphone setup.

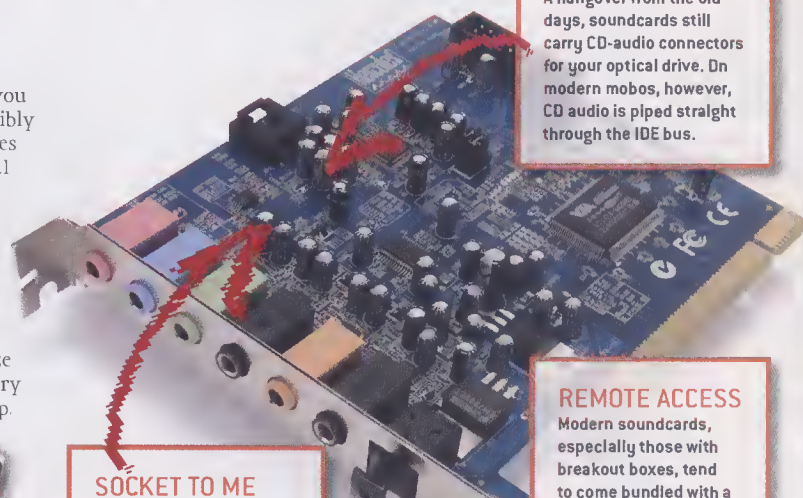
BOX OF TRICKS

The breakout box is the physical 'front end' of a modern soundcard. Some, like Creative's X-Fi Fatal1ty, are designed to be mounted into a free 5.25-inch optical drive bay in your PC chassis, but there are others which happily sit on top of, or beside, your PC as standalone units. They give you access to a range of controls including volume, balance, tone etc. Don't choose a breakout box over more key features like Low SNR, 96KHz sampling and 24-bit DACs, though.



SOCKET TO ME

5.1 and 7.1 surround-sound cards have various ports for all your speakers. Most soundcards also carry an S/PDIF (Sony/Philips Digital Interface) digital sound socket.



THE CD SIDE

A hangover from the old days, soundcards still carry CD-audio connectors for your optical drive. On modern mobos, however, CD audio is piped straight through the IDE bus.

REMOTE ACCESS

Modern soundcards, especially those with breakout boxes, tend to come bundled with a remote-control handset, perfect for media centre setups, and for when your breakout box isn't to hand — under the table in your PC, for example.



FIGHT OR FLIGHT

Fight in the air or on the ground. Fight on the beaches or at sea. Fight during the day or through the dark of night. Fight with valor. Fight with might.

Defend your armies, whatever the cost may be. Patrol the skies. Hunt down your enemies. Attack your foes. Never retreat. Never surrender.

Fight with speed. Fly with ease. Fight with these weapons and victory will be yours. So go to your nearest retailer then head into battle.

Eclipse II



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- > Media keys control audio
- > Variable lighting control dimmer
- > 3 Position keyboard angles from zero slope
- > Side lighting helps reduce computer eye strain

PC Gaming Mouse

- > 1600 DPI precision
- > 6 Buttons
- > Fully programmable
- > Translucent, illuminated rim
- > Fatigue free, ergonomic design



X52



- > Non-contact technology on X & Y axes
- > 3D Rudder twist
- > Adjustable ergonomic grip system
- > 200+ Advanced programmable commands
- > Illuminated buttons and MFD

Pro Flight Rudder Pedals

- > Precision rudder axis control
- > Adjustable pedals with integrated toe brakes
- > Adjustable resistance for realistic feel
- > Strong, stable base



Saitek™

How to Choose Speakers

➤ If you want a kickass gaming experience, don't skimp on your speakers!

One of the biggest mistakes you can make when putting together a PC gaming system is to underestimate the critical importance of sound reproduction. Leading game developers are pouring tremendous resources into the audio side of their game designs, so that their games sound as good as they look.

And with good reason: Independent research has proven that our perception of visual quality is directly affected by the quality of the audio that accompanies it. In the gaming world, this means that you'll get more enjoyment out of a game if you play it through a good set of speakers.

The big question, then, is what features define a good set of speakers? We'll show you what to look for, and what we consider to be some of the best products in their class.

AMPLIFIER: When you're talking about speakers for your PC (often called "multimedia speakers"), it's absolutely essential that the speakers be self-amplified. A lot of manufacturers will throw around amplifier specs such as "500 watts of power!" Don't be impressed until you know the speakers' meaningful specs, which will be expressed as "N watts per channel, RMS." RMS (root mean square) is a formula for describing the level of a signal, and it is considered the most accurate means of measuring an amplifier's output.

SPECS: Don't be over-influenced by manufacturers' specifications. A modern, efficient amp can drive speakers effectively without pumping massive amounts of power into them. This is especially true for multimedia speakers, since they're designed for near-field listening. An amplifier's total harmonic distortion (THD) rating, for instance, is at least

as important as its power output: An amp that pumps out 100 watts per channel RMS will sound like crap if it's generating more than one or two percent THD (THD ratings are inevitably higher for subwoofers).

If at all possible, insist on a personal listening test before throwing down your cash for any speaker system.

SURROUND SOUND: Game developers are following the movie industry's lead in creating multi-channel soundtracks. If your computer is equipped to decode these soundtracks and you can swing the budget for a 5.1-channel (or higher) speaker system, you'll enjoy listening to audio events in games emanating from specific speakers (an enemy shooting at you from behind, for instance).

A 5.1-channel speaker system will actually consist of six components: right and

■ Logitech's been a power player in the PC speaker market for a few years now.



■ If you can't afford a good 5.1 setup, go with a high-quality 2.1 kit instead of a cheap-o 5.1.

left front satellites, right and left surround satellites, a center speaker, and a subwoofer (for low-frequency sound effects). A 6.1-channel system adds a rear center speaker, and a 7.1-channel system adds left and right rear speakers. If you're on a tight budget, however, you'll be better served by a good 2.1-channel system (stereo satellites and a subwoofer) than by a cheapo surround-sound system.

Some multimedia speaker systems are equipped with digital audio inputs and hardware for decoding surround-sound algorithms, such as Dolby Digital and DTS. This is a handy feature if you're going to plug in a PS2 or Xbox into your speaker system. THX, on the other hand, is not a surround-sound algorithm; rather, it is an audio-video certification. Products that comply with a set of standards established by Lucasfilm, Ltd. are bestowed with THX certification.

SHIELDED SATELLITES: Your satellite speakers will likely be in close proximity to your video monitor, so it's essential that their cabinets be magnetically shielded; otherwise, they'll eventually damage your monitor. This is less of a concern for your subwoofer, since it will be most likely be placed on the floor.

REMOTE CONTROL: You'll need to control some aspects of your audio experience using software, but it's much easier to set the volume with a big old-fashioned knob. If you anticipate using headphones, look for a conveniently placed headphone jack either on one of the satellite speakers or on the speakers' control pod.



THE
CONQUEROR
RETURNS

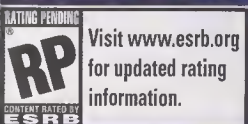
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CAESARIV.COM



How to Properly Arrange Your 5.1 Speakers

➤ The experts at Monster Cable teach us how to maximize our surround sound experience when PC gaming on the living room HDTV

FRONT AND CENTER

The front speakers should be placed at even height, equidistant from the center of the screen, and angled towards your viewing spot on the couch.

THE VIEW

It's best to hook up your PC to the TV with a DVI cable if your video card and HDTV support it. As for proper viewing distance? For a 40-inch screen, you should sit around eight feet away. For 50-inch? About 10 feet. And a 60-inch behemoth? Twelve feet.

LIGHTS OUT

Light is gaming kryptonite. It's best to turn off all the lights when gaming.

KICK IT

A plush couch is the key to any home-theater setup. If you're not comfortable, you won't be able to enjoy your games! The armrests on this beauty hide a cup holder and ice bucket – so there's virtually no need to ever get up!

WOOF WOOF

Your subwoofer should ideally be placed in a corner of the room so it can reverberate off the walls and give you better "thump." It doesn't matter if it's a front or back corner.

PULLING UP THE REAR

Rear speakers (not shown at this angle) should be placed the same distance apart as the fronts, and should be angled toward you. If your couch is against the back wall, just point the speakers straight at the center of the couch. You'll still get an excellent surround effect.



FEED YOUR NEED FOR SPEED.

LOW-LATENCY, HIGH-PERFORMANCE MEMORY.

You crave it. You demand it. Your game depends on it. It's more performance, and that translates into more memory. Whether you're a casual enthusiast or a hard core game connoisseur, Crucial.com has the density you need (and the price you want) on high-performance, low-latency memory to help you get the most out of your system.

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- Expert Online Assistance
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(For a limited time, on orders of \$40 or more shipped within the contiguous US.)

GAMERS Need high-density, low-latency gaming memory?

Games play better with more memory! Don't settle for stutter (hiccup), barely playable games – a memory upgrade can boost system performance and make your gameplay more enjoyable. When you're playing today's demanding new game titles, adding RAM helps boost frame rates and shorten load times.



MODDERS Is bling your thing?

If you like to trick out your case and show off at LAN parties, the eye-candy Ballistix™ high-performance memory line is right on target, designed for gamers and power users seeking maximum system performance, stability, and BLING! Ballistix memory comes with an eye-catching black PCB and gold integrated heat spreaders. Ballistix Tracer™ modules, unlike other illuminated memory, feature two rows of lights that actually correspond to real-time memory activity. Ballistix Tracer memory also comes with a black PCB, black integrated heat spreaders, and blue ground-effects lights.



TWEAKERS Need stable RAM that won't melt down under your custom settings?

Slow system memory can cripple your cutting-edge processor! The Ballistix high-performance memory line was developed specifically for serious gamers and power users who are trying to squeeze every bit of performance out of their systems. You want advanced speed grades, low latencies, and integrated heat spreaders to keep the memory running cool – things that are really important in delivering a next-generation computing experience.



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How to Catch a Mouse

➤ You'll only play as well as your mouse lets you

Buying a mouse used to be a simple task: You went out, picked up one that felt good in your hand, and called it a day. Now there are dozens of different mice, and they're all offering different features—high resolution, variable speed settings, laser, wireless, and Bluetooth. Hell, you can even buy a mouse with a fingerprint scanner built-in.

But what matters for gamers? There are a variety of mice on the market designed specifically for gamers, and they're not all created equal. Here are our criteria:

RESOLUTION

The resolution of the mouse has a direct impact on both the speed you turn and the level of control you have in games. As always, higher resolution is better. We recommend a mouse with a minimum of 1,600dpi these days.

With a high-resolution mouse, you can set the mouse sensitivity in-game to be rela-

tively low, which will give you quick, even movement across the entire field of view. If you're stuck with a lower-res mouse, moving the mouse from side to side while zoomed in (to snipe, for example) could create an unpleasant stair-step effect, where the crosshair moves several pixels at a time.

Newer mice, like the Logitech MX518 and the Razer Diamondback, allow you to switch the mouse's resolution on the fly—while you're in the game. This lets you use a high sensitivity setting for driving vehicles, and a lower sensitivity setting for actions that benefit from fine movements, like sniping or flying.

COMFORT

Comfort is a key criteria for any mouse purchaser, however, finding a comfortable mouse can be extremely challenging, especially for lefties. The easiest way to tell if you're going to like a mouse is to take it for a test drive. Head to your local Best Buy or CompUSA, where they'll have dozens of

rodents on display for you to test out. Give yourself a few moments with each mouse, and take note of the button positions, the number of buttons, the placement of the scroll wheel, and the weight of the mouse. Most manufacturers use a similar mouse chassis for multiple mice, so you can usually get a gaming-suitable mouse in whatever chassis you prefer.

There are very few ambidextrous gaming mice on the market (the Razer Diamondback is one), so left-handed mousers will need to either mouse with their right hand, or choose a lefty-friendly mouse.

WIRED OR WIRELESS?

For games, we've got to recommend wired. Wireless has come a long way, battery life is longer, reliability is good, and most of the lag issues have been solved. However, the batteries add extra weight to the mouse, and there's nothing more frustrating than losing a heated deathmatch because your battery died.



Logitech MX518

Using a hyper-sensitive mouse can be both a blessing and a curse. Sure, having lightning-quick turn speed and pixel-perfect accuracy are great in a hot-'n-heavy deathmatch, but when you're sniping, 1,600dpi is just too twitchy. For the best of both worlds, Logitech's MX518 lets you change the resolution on the fly using two hard-wired buttons.

The two buttons above and below the MX518's scroll wheel control the mouse resolution. Press the button above the wheel, and the resolution goes up and the mouse speed

increases. Press the button below the wheel, and the resolution goes down and you gain finer control over mouse movements. The mouse ships with three presets—400dpi, 800dpi, and 1,600dpi—that work all the time, even if you haven't installed Logitech's mouse drivers. If you install the drivers, you can reconfigure the sensitivity settings to better suit your needs.

Getting this to work in games takes a little tweaking, but the benefit is huge, especially in games that include vehicles.



Razer Diamondback

Like the MX518, the Razer mouse allows you to adjust the mouse's sensitivity on the fly. However, you have to install Razer's special drivers to get the function to work. Unfortunately, Razer's scroll-wheel sensitivity adjustment makes it really difficult to make precise changes to the Razer's sensitivity in-game.



Logitech G5 Laser Mouse

The Logitech G5 Laser mouse may just be our favorite mouse ever. With a whopping 2000dpi laser sensor, buttons for adjusting the sensitivity on the fly, and customizable weights that load into a slot on the bottom, there's no better mouse out there today.



Razer Copperhead

The Razer Copperhead descends from a long line of gaming mice (such as the Diamondback also featured on this page). For all the lefties stranded out in the cold by the gaming mice designed to fit right-handed players, this is an excellent choice for a high-dpi mouse with adjustable sensitivity.

Cool Performance



HOW CORSAIR MAINTAINS TECHNOLOGY LEADERSHIP

Here's the latest in Corsair's ten year heritage of innovation in performance memory: we've redefined memory heat sink technology. And the result is unprecedented performance and reliability. When we ran a preview module through system benchmarks at COMPUTEX, an overclocked DHX module with our optional airflow fan was able to hit a heart-stopping 1250MHz (PC-10,000) while maintaining cool, reliable performance.



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Pushing performance specs generates heat, and that can compromise reliability and component life. The advanced cooling ability of DHX heat sinks keeps your memory safe and reliable even as you push it to the limit. Under the name XMS2 Dominator, this DHX technology will be showing up on both Corsair parts designed for extreme overclocking and on memory designed for performance computing and gaming.

Also Featuring Enhanced Performance Profiles (EPP)

As with all new Corsair performance memory, XMS2 Dominator modules feature EPP, the new open standard for the Serial Presence Detect (SPD) jointly developed by NVIDIA and Corsair. EPP simplifies overclocking for beginners and provides unparalleled control for experts.



An optional fan (not shown) provides even more cooling and protection.



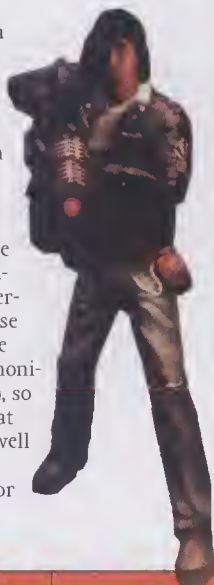
Corsair's proprietary DHX technology dissipates heat two ways: it draws heat away from the module through the RAMs and provides an additional path for heat transfer within the module through the ground plane!

ORDER FROM THESE OFFICIAL CORSAIR RETAILERS OR VISIT WWW.CORSAIRMEMORY.COM

How to Choose a CRT Monitor

➤ Screen size and resolution

The first decision point is picking a screen size. Sizes are generally specified by the diagonal size of the CRT tube. The most common are 17", 19", and 21", with a 4:3 Aspect Ratio, which specifies the width vs. the height of the screen. Note that the viewable part of the screen inside the monitor bezel is generally about one inch less than the tube size. Pay attention to the "viewable" size, since it's the part you actually see. If you can afford it, bigger is generally better, but too large a screen may cause eyestrain, so try several out for size before you buy. In general, we steer clear of 17" monitors (too small) and 24" monitors (too big), so 19" or 21" is the sweet spot. One of the great advantages of CRTs is that they perform well over a wide range of resolutions, but for optimum image quality, you should aim for the following:



■ Ah, the tried-and-true, trusty 'ol CRT.

17"	1024 x 768	to	1152 x 864
19"	1152 x 864	to	1280 x 1024
21"	1280 x 1024	to	1600 x 1200

■ Presenting our handy-dandy size-to-resolution chart. Ain't it fabulous?

SHADOW MASK OR APERTURE GRILLE OR SLOT PITCH

There are two common types of CRT tubes: Shadow Mask and Aperture Grille. Shadow Mask tubes have a screen made up of round red, green, and blue phosphor dots. Aperture Grille tubes have alternating vertical stripes of red, green, and blue phosphors. Which type is better? They're both suitable for most applications, but there are differences. Shadow Mask tubes can show finer detail, but they also tend to produce stronger Moiré inter-

ference patterns on-screen (which look like rainbow colored swirls). Aperture Grille tubes generally produce images that are brighter and higher in contrast, with colors that are somewhat more vibrant and saturated, but they tend to be more expensive. They also include two very fine horizontal damper wires that are generally invisible to most users but can drive others crazy.

Dot Pitch or Slot Pitch describes the spacing between the RGB phosphors in millimeters. In general, the smaller the better, but this spec is much-abused and misunderstood, so always take this spec with a grain of salt. Note that you can't compare

the pitch values between Shadow Mask and Aperture Grille tubes since they are completely different. In fact, you shouldn't compare the pitch values between different manufacturers or tube designs.

FLAT OR CURVED SCREEN AND ANTI-REFLECTION COATING

The natural shape of all CRT monitors is curved, but they are now manufactured in flat versions at somewhat higher cost. Flat screens are better because they minimize visual distortions and glare. However, the flatter the tube, the more likely there will be some geometric distortion and reduction in sharpness, particularly in the corners. When viewing a "perfectly flat" CRT at the computer store, pay close attention to the corners of the display to determine if the distortion levels are acceptable to you.

You'll also want to make sure a CRT has an anti-reflection coating, because without it, you'll see a mirror image of everything in front of the CRT, including yourself and everything behind you. Not only is this distracting, but it significantly reduces the contrast and readability of the screen. Anti-reflection coatings range from the cheap and relatively ineffective frosting (which also reduces image sharpness) to dielectric layers like those on high-quality lenses. If you work in a relatively darkened room, anti-reflection will be much less important than if you work in a brightly lit environment.



CONNECTORS

➤ All CRT monitors come with a VGA-style DB-15 connector. Some high-end monitors also include five BNC connectors for individual RGBHV connections. These are recommended if you're running cable lengths over 15 feet.

How to Choose an LCD Monitor

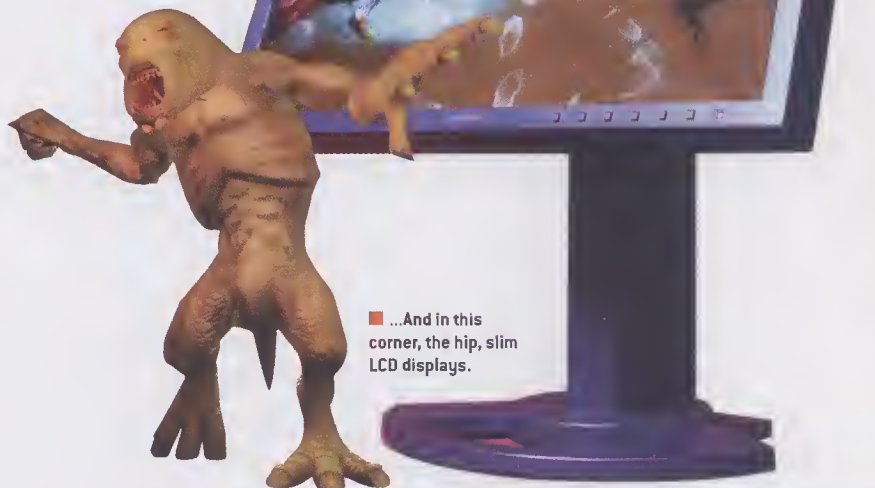
➤ Response time and motion artifacts

Beware - Older (and suspiciously cheaper) LCDs have a relatively slow response time compared with CRTs, and they suffer from varying degrees of motion-smear, motion-flicker, and other motion artifacts. Most panels include a response-time specification in milliseconds. In general, the smaller the better, but this spec is "spun" by manufacturers sometimes, so be cautious. Some manufacturers quote separate (and smaller) rise and fall times. Also, the times refer to transitions from peak white to black, whereas the more common gray-gray transitions are much slower. Look for a response time around 16ms for a good gaming experience.

In order to minimize additional motion artifacts, make sure that you set your refresh rate to the native refresh rate of the panel, which generally is 60Hz. This should be in the monitor's spec sheet. Setting it to a different value (particularly a higher value like 75Hz) will reduce image quality in analog mode and may introduce strobing effects and some image break-up when there is motion. Using a DVI cable to connect to your graphics card (pretty much any card you buy now will have at least one of these ports) will provide a much cleaner picture - we can't recommend this enough.

IMAGE QUALITY ISSUES

LCDs can have outstanding image and picture quality. When properly adjusted, they can produce a perfectly sharp image, something that is beyond the capability of a CRT. But there are some areas where LCD performance may be weak: They have trouble producing pitch-black and usually produce some level of dark-gray instead (which can be a downer while playing dark games like *Doom 3*), and they may have trouble reproducing intensities near



■ ...And in this corner, the hip, slim LCD displays.

peak white (called "white saturation"). The gray-scale may be uneven, particularly at low intensities, and the Gamma may be way off, resulting in color-calibration errors, that can affect digital photographs. Your monitor will probably come with a utilities CD with color-correction programs - make sure to use them when you set up.

SCREEN SIZE AND RESOLUTION

The most common screen sizes are 15", 17", 18", 19", and 20", (though Dell has now pushed the envelope with screens up to 30") with a 4:3 or 5:4 Aspect Ratio, which specifies the width vs. height of the screen. Some monitors are now being offered in 16:9 aspect ratio, which is fantastic for watching movies in widescreen. More and more games are supporting this aspect ratio, and there are often work-arounds for ones that don't.

15"	1024 x 768
17" - 19"	1280 x 1024
21"	1600 x 1200

WIDESCREEN	1080 x 720
WIDESCREEN	1200 x 1600

■ Widescreen is where it's at if you're buying a new LCD.

Make sure you observe your screen's native resolution. Running at non-native resolution forces the image to be re-scaled, which can cause nasty blurring effects. See the table above for common native resolutions.

ANALOG OR DIGITAL

➤ Most LCDs are connected to the computer via the same analog VGA DB-15 connector as CRTs. That makes them an easy replacement for CRT monitors. However, LCDs operate at a fixed pixel-resolution format, so the monitor must analyze the analog signal and try to extract and measure each individual pixel in the image. That's easier said than done, and if it's not done exactly right, the LCD image actually will appear a bit fuzzy and include some digital noise as well. Some LCD monitors also include a digital or DVI interface that transmits the signal to the monitor digitally, which largely solves this dilemma. Most monitors sold today have both DVI and analog input connectors.

PERFORMANCE ISSUES AND DISPLAYMATE

There are considerable differences in performance between different monitors. Even if you know what to look for, it's hard to make a decision without the right tools and test patterns. *DisplayMate* is the computer industry standard for testing and evaluating monitors. *PC Gamer* uses the advanced *DisplayMate Multimedia Edition* for testing and reviewing all of the magazine's monitors. There are also end-user versions, designed to help users set up and tune up their monitors for optimal image and picture quality. They're excellent for monitor testing and evaluation before you make your final purchase.

Monitor Musings

➤ There are no dumb questions...

Cable Query

Q If I upgrade from a CRT to an LCD, do I need to upgrade my videocard as well? Will there be any issues connecting my current videocard to my new display?

A It depends on your hardware, but probably not. The standard connection for a CRT is an analog DB-15 cable, and most LCDs include this type of connector. However, LCDs are capable of sending a digital signal, so they use a DVI (Digital Visual Interface) connector. In order to use this type of connector, it must be supported on your graphics card. Luckily, most any modern videocard will sport both types of connectors.



Is Dual Display OK?

Q I'm sick of being constrained to a single desktop! What do I need in order to run dual displays?

A Well, besides two displays, you need either a videocard with dual outputs or two physical videocards. Luckily, most mid-range to high-end videocards released in the last few years have included both an analog DB-15 connector as well as a DVI connector for an LCD. If you have one of these videocards and want to run two LCDs, you'll have to acquire a DVI to DB-15 adapter, which are available at Radio Shack.

If your videocard only has one output, you'll have to run the second display from a second physical videocard. Dual-displays are supported in Windows XP, so as soon as you plug in the second display XP will recognize it and allow you to set its resolution from the Display Settings menu (right-

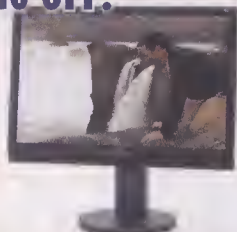
click on the desktop and select Properties, then Settings).

ATI and nVidia both offer their own multi-desktop software that allows a range of options for handling two (or more) monitors.

If you're concerned about gaming issues with dual-displays, remember that when you fire up a game it will automatically run on the gaming card and be displayed on one monitor, so the secondary display will just be for desktop work. Very few games support playing games over two monitors, with flight sims being the notable exception. ☺



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700:1 Contrast Ratio

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BUILD IT!

A step-by-step walkthrough guide to building your own
GAME-CRUSHING PC without breaking your bank account



Parts List

YOUR GAMING PC AWAITS!

This menu of components is everything you need to build your own affordable gaming powerhouse PC. Of course, "affordable" is a subjective term, so we've also listed ways to cut a few corners and bring your dream system down within your grasp. Now all you have to do is follow this awesome step-by-step guide, and in a matter of a few short hours you'll be up and running. Enjoy!

CASE: ASPIRE X-Navigator ATXABNW-AL/500 \$154

POWER SUPPLY: ENERMAX E6701AX-VE 5FMA (24P) 600-watt \$125

CPU: AMD Athlon 64 3500+ (Socket 939) \$94

MOTHERBOARD: ASUS A8N-SLI ATX \$115

RAM: Rosewill 1GB (2 x 512MB) \$70

VIDEO CARDS: Two PNY GeForce 7800 GTs \$588

OPTICAL DRIVE: Plextor PX-740A \$74

FLOPPY: MITSUMI US82.0 & FDD Digital Card Reader FA404A/404M \$18

HARD DRIVE: Western Digital Caviar SE 320GB, Serial ATA150 \$115

SOUND CARD: Creative Labs Sound Blaster X-Fi XtremeMusic \$112

OS: Microsoft Windows XP Home Edition with Service Pack 2 \$90

TOTAL: **\$1,401**

And if you use a single GeForce 7800 instead of two: \$1,107

And if you also decide to use ASUS's onboard audio instead of an X-Fi: \$995

*Prices from www.NewEgg.com as of 08/06

GROUND RULES

1) The only tools you'll need for this project are your wits, your hands, and a good Phillips-head screwdriver. Your case comes with all the screws and brackets you'll need.

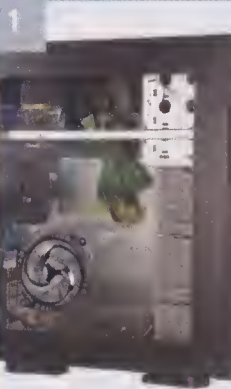
2) Always make sure that you're grounded before working on any PC. Static electricity can severely damage delicate (and expensive) circuitry. Ground yourself by keeping one part of your body (yes, even that part) in contact with the metal frame of

your PC case at all times, and avoid working on carpet if possible.

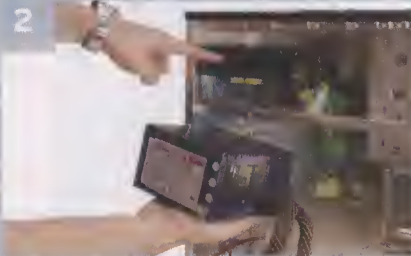
3) If a component doesn't want to fit, don't force it. Stop and make sure you're putting it in correctly.

4) Don't overturn your screws. Snug, yes, but any tighter may strip the thread or damage the component you're attempting to secure.

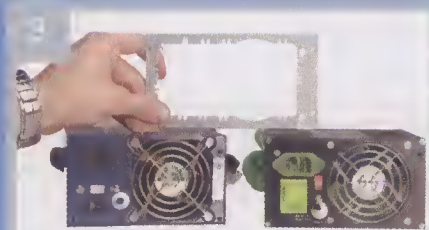
5) Keep your manuals; they'll come in handy.



The ASPIRE X-Navigator case we chose for this project has a lot going for it: It's got a side window, loads of lights, drive bays, a whopping five 80mm fans, and a shiny metal interior. Ooooooh, shiny!



But it's also got a "wimpy" 500-watt power supply, so later on in the build we're going to replace it with a 600-watter from ENERMAX, which is more SLI-friendly.



For now, we're just going to remove the existing unit so that we've got more room to work inside the case. That said, once you've unscrewed the old power supply, make sure that you also remove its mounting bracket...



... And screw it onto the new power supply. Once you've done this, go ahead and put the power supply aside for now; we'll pop it into the case towards the end of the build.



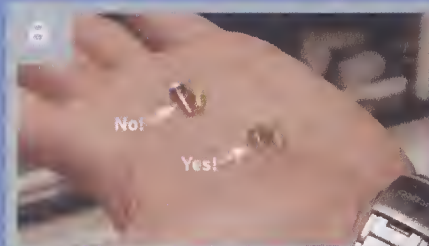
You'll also want to remove the tower's three drive bay baskets. Remove them by sliding to the left each of their locking arms and then pulling each basket straight back and out.



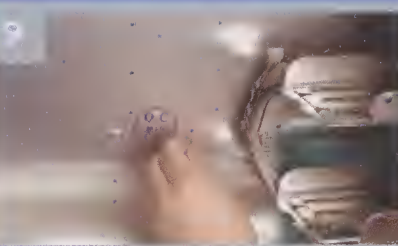
Now that your case is all-but completely empty, you're going to have a much easier time reaching your hands in and working. Move the case's own wires out of the way as best you can.



Our case comes with two 80mm fans attached to the rear of the tower. You may want to remove them for now. Remember which way they're facing for when you pop them back in later.



We're a few steps away from installing our motherboard. Before we do, we'll need to get our screws straight; our case comes with many. The smallest screw with the finest threads works with the gold-colored mobo mounts...



... Which you'll now want to install in the back of your case — nine of them, one for each of your mobo's nine holes. Line them up properly! Place one under the motherboard by mistake, and your system may not work.



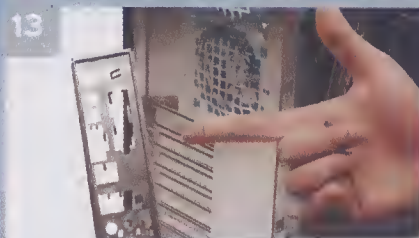
One more thing to do before we drop in the mobo. We need to replace this case's stock I/O shield with the one that came with our motherboard. Pop the old one out by pushing in on it from the outside of the tower.



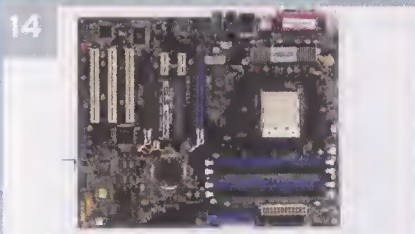
Pop the new one in from the inside of the tower. Remember how at the start of this build we told you not to force anything? Yeah, when it comes to this step, we didn't really mean it; you may have to push a bit to get the shield in.



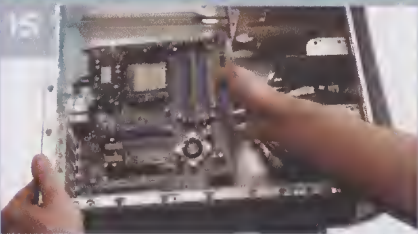
And you'll know you've pushed too hard when you slice open your finger as we did here. Learn from my mistake and don't rush your build. Many components (like this here I/O shield) are sharper than they seem.



Ah, nothing an entire box of tissue and a few minutes of direct pressure can't fix. Now that we've patched ourselves up, it occurs to us that we've probably cut ourselves at least once in every build we've ever done. But chicks dig scars.



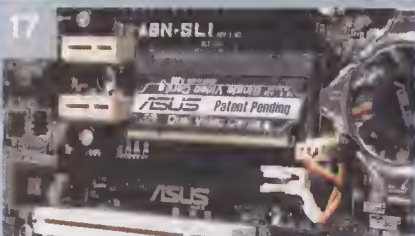
Here is your motherboard. She's a real beauty, ain't she? The Asus A8N SLI is the mobo to have right now. It's bug-free, SLI-capable, and solid. We pity the fool who builds a new PC without one.



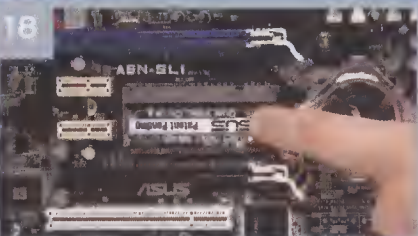
Now that your nine mounting screws are in place (you lined them up with the screw holes in your mobo, right?), lay your case flat and very gently place your mobo inside and secure it with the little screws we talked about in step 8.



Now's a good time set your motherboard for single or dual-video-card operation. This here chip that sits between your motherboard's two x16-sized PCI Express slots is what you need to be looking at.



If you plan to run one GeForce card, just leave it on "Single Video Card." But if you're running two, unhook the two fastening clips from this little chip and it'll pop up at a 35-degree angle.



Once it has popped up, simply pull it gently out, flip it around to the "Dual Video Cards" side, place it back in at 35 degrees, and then once it's in place, push it back down gently until it clicks.



If you bought your CPU from a reputable retailer like Newegg.com, your CPU and heatsink combo will look like this when you open the box. Be sure to check the CPU markings to confirm that you received the correct processor.



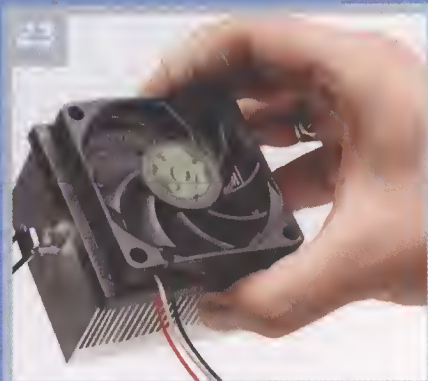
Before we can drop our CPU into our mobo we have to unlock its socket by gentling swinging its socket lever up to 90-100 degrees. Don't wrestle it! Move the arm slightly away from the socket and then up; it should move easily.



Note the small gold triangle on one corner of your CPU. IMPORTANT: Be sure to line it up with the small (sometimes-hard-to-see) triangle at the corner of your motherboard's CPU socket; that's the only way it fits.



Remember, your CPU will only fit in ONE WAY, if you've followed steps 2D and 21, your CPU should drop right into the socket under its own weight. Do NOT force it. Once in place, swing the socket lever back down until it locks.



Cool-looking, oversized CPU heatsinks are all the rage right now, but if you're not planning to overclock (much), AMD's own included heatsink does its job very well, and so there's no need to upgrade.



Another nice feature of AMD's heatsink is that it comes with a thermal pad, and therefore requires no messy thermal paste. Simply plunk the heatsink onto your new CPU, lock it down, and you're set.

Quick Reference: Crucial Information

THERE ARE SOME NAMES AND NUMBERS YOU ABSOLUTELY MUST HAVE WHEN YOU CONFIGURE A NEW MACHINE, AND IT HELPS TO HAVE THEM HANDY. HERE'S OUR LIST—CLIP THIS OUT AND TAPE IT TO THE INSIDE OF YOUR CASE.

MOTHERBOARD MODEL:

CPU SPEED:

VIDEOCARD MODEL:

WINDOWS XP SERIAL KEY:

DIAL-UP INFORMATION (OR PPPOE LOGIN)

DIAL-UP NUMBER:

USERNAME/PASSWORD HINT:

TECH SUPPORT PHONE NUMBER:

NETWORK INFO:

WIRELESS NETWORK NAME:

WIRELESS NETWORK WEP KEY:

STATIC IP ADDRESS:

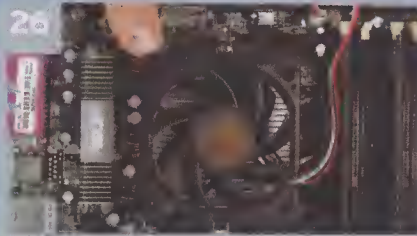
DNS ADDRESS:

SUBNET MASK:

GATEWAY:



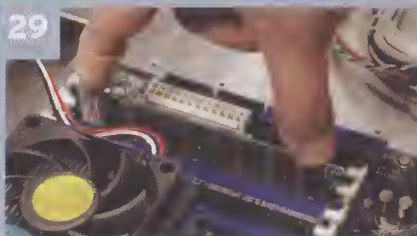
Installing the heatsink is a breeze. The unit can fit two ways, with the locking mechanism either facing in towards the motherboard or out towards the edge. Hook the sink's metal clasp to the mobo's plastic clip...



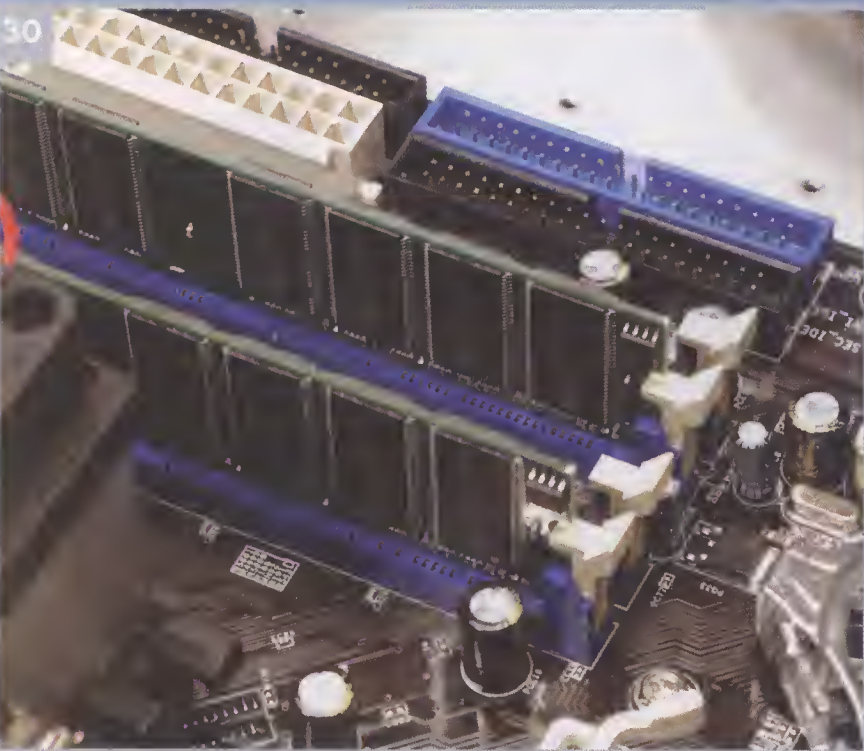
...Then do the same thing on the other side – the one with the locking arm. Once both sides are hooked in, swing the locking arm down into place. That's it! Installing AMD heatsinks isn't as tough as it used to be.



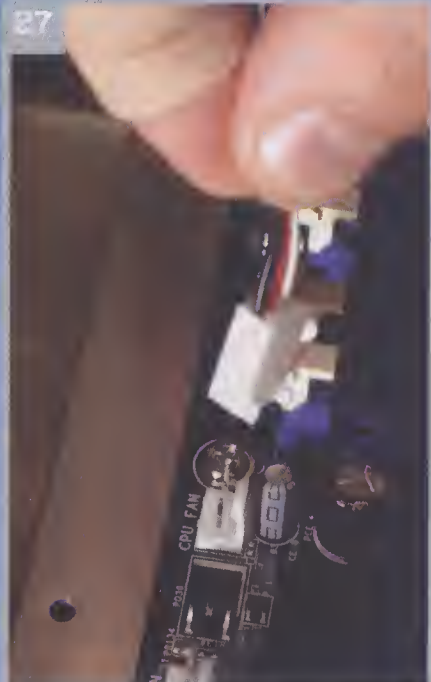
Time to install our RAM. We've got two 512MB sticks. We need to make sure that we put each of them into the same-colored slots. Start by pulling out (to 45 degrees or so) the two white clips on either side of each RAM slot.



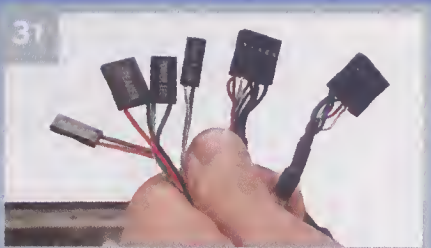
Our RAM only fits into each slot ONE way; make sure that it's oriented properly. Push the first stick straight down into place with a little bit of force. The two white clips should pop back up to 90 degrees once the RAM is in, but...



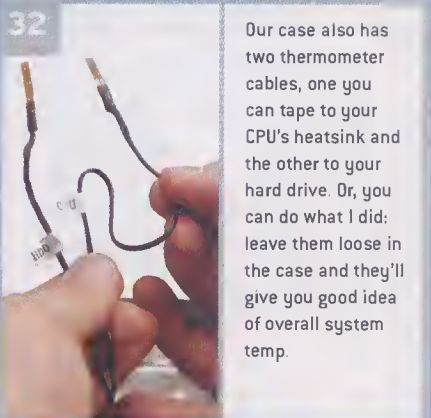
...That doesn't always happen. Sometimes the clips pop up most of the way once the RAM is in but you still need to close them the rest of the way yourself in order to lock your RAM into place securely.



The wire coming off of your heatsink needs to be plugged into your motherboard so that the sink's fan has power and can spin. Our motherboard has two clearly labeled CPU fan connectors. Plug into CPU Fan 1.



Our tower sports cables that need to be connected to our mobo in order for its buttons and lights to work. Each cable is labeled and fits into the corresponding mobo connector at the bottom, right-hand side of the board.



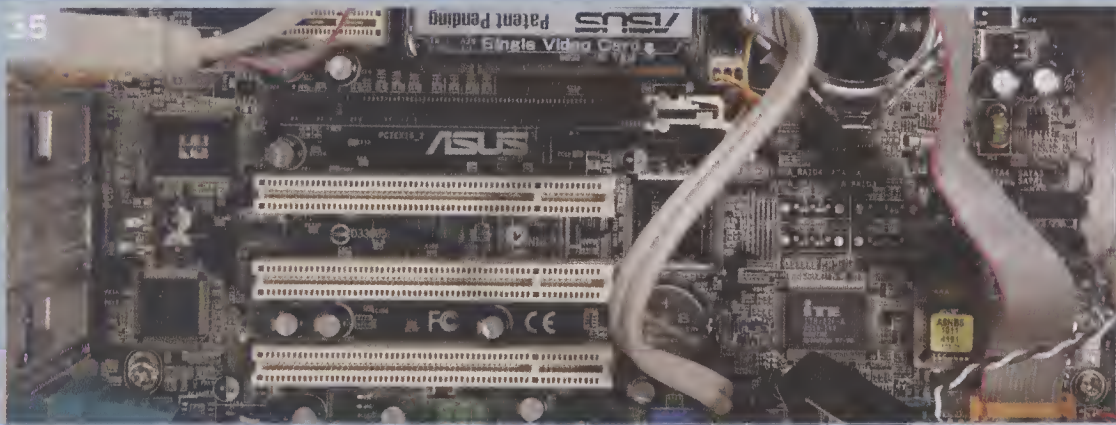
Our case also has two thermometer cables, one you can tape to your CPU's heatsink and the other to your hard drive. Or, you can do what I did: leave them loose in the case and they'll give you good idea of overall system temp.



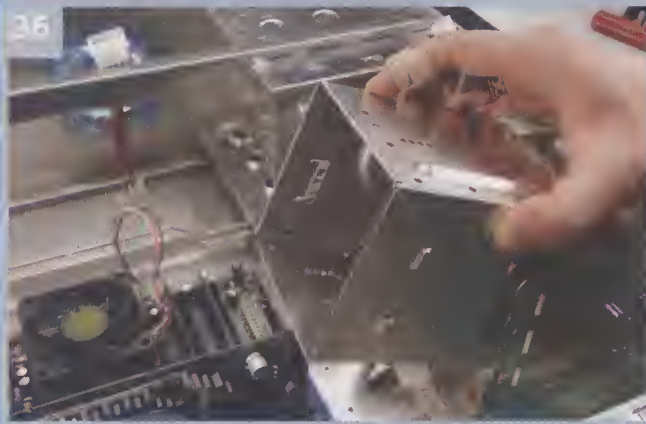
Your motherboard comes with several additional port modules that you can install if you wish. Be aware that they take up expansion slots in the rear of your case (step 34), which will limit your ability to add PCI cards.



In our rush to put this system together [and because we're crazy for extra USB 2.0 ports!], we made the mistake of adding in all three of the ABN-SLI's expansion-port modules. But that just wasn't going to work because...



.. We'd forgotten that we needed to keep one of the USB headers on our mobo free for the floppy/media reader we install in step S3. Also, we'll need extra room for adding in an SLI-module security bracket in step 64.



It'll be tricky getting our drive bay baskets back into place if we've already plunked our PCI and PCI-E cards into the mobo. So before we start installing any cards, let's mount our hard drive in the lowest basket and put it in the case.



Our 320 WD hard drive comes with a unique-looking SATA cable (shown above the hard drive). This cable is functionally the same as a standard SATA cable (shown below the hard drive), but connects more securely to your hard drive.



Here you can clearly see the difference between WD's SATA cable and a standard SATA cable. WD's cable plugs into our hard drive's SATA data connector *and* its power connector (but draws no power from your motherboard).

39



If it's been a while since you built a new PC, the connectors on the back of your hard drive may look a little alien to you. On the left are the drive's SATA connectors, and on the right are jumper pins and a legacy power connector.

40



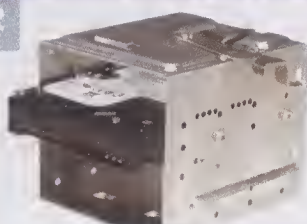
Remember jumpers – the tiny little plastic clips that tell your hard drive whether it's a slave or a master? Good news, you don't need 'em anymore! (Not on your SATA hard drive at least.)

41



If your hard drive happens to come with any attached, they'd be right about where we're pointing at. Go ahead and remove them; they're history. Don't throw them away, though. You never know when they might come in handy.

42



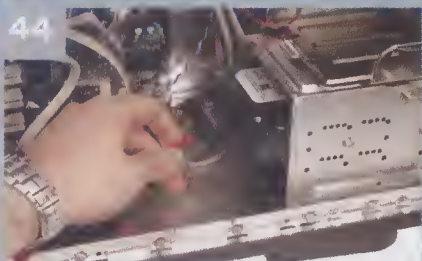
Here's how you want to mount your hard drive into its drive bay basket. Make sure that you mount it using ALL FOUR SCREWS. A hard drive should be locked in tight to help ensure its long life.

43



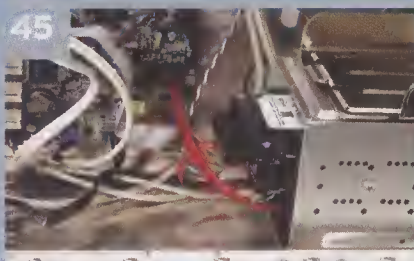
Now go ahead and slide the basket back into the bottom of your case and lock it in. You don't want this sucker sliding around should you ever take your PC to a LAN party.

44



Now we're going to use WD's cable to connect the hard drive to our motherboard. The big end goes into the hard drive, and it only fits one way. Don't force it.

45



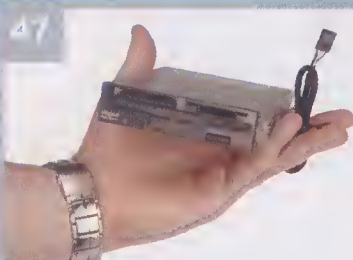
The small end plugs into your motherboard (SATA1), and it, too, only fits one way. The inside of our case is getting a little busy, so we'll push the excess, SATA cable into the HD basket.

46



Before we can install our floppy and optical drives, we need to remove some plates from the front of our tower. Behind the black plastic plates are metal plates. Remove them, too.

47



Floppy drives aren't dead! Drivers still occasionally come on floppies, so it's a good idea to have a drive in your system. This one is a floppy drive and a USB 2.0-powered media reader.

48



The floppy portion of this drive uses a standard ribbon cable to connect to your mobo. But it also sports a USB connector that you'll need to attach for media-reader functionality.

49



Our ASUS motherboard comes with labeled ribbons so that you know exactly which one to use and when. This one says "Floppy," so we of course tried to attach it to our hard drive first. Der!

50



Now mount the floppy drive into one of your remaining two drive baskets. Like the hard drive, remember to use all four screws! Mount the drive so that it's sticking out a bit from the basket.

51



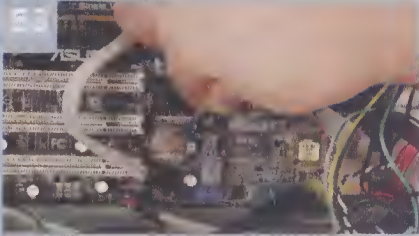
If you've done this just right, your floppy drive will be flush with the front of your tower once you've installed its basket into the top-most basket slot. Pretty cool, huh? You know it!

52



Installing your floppy's basket is just as easy as installing your hard drive's. Again, just slide it into the top-most basket area and lock it into place by sliding forward its protruding metal latch until it clicks.

53



This picture shows where on your mobo you'll eventually want to plug-in your floppy's USB cable. Don't do it now, though! Wait until you've installed Windows.

54



Leave the USB cable unplugged, but go ahead and pop the floppy's ribbon cable into the motherboard as shown. It'll only fit in one way, so don't force it! (But do make sure it's in all the way.)

55



Before we can install our optical drive into our case, we need to attach two guide rails (that come with our case) – one on each side – using four small screws per rail.

56



It'll look like this after the rails have been attached. Don't tighten the rails all the way down until you've made sure that the face of the drive sits flush with the front of your case when inserted.

57

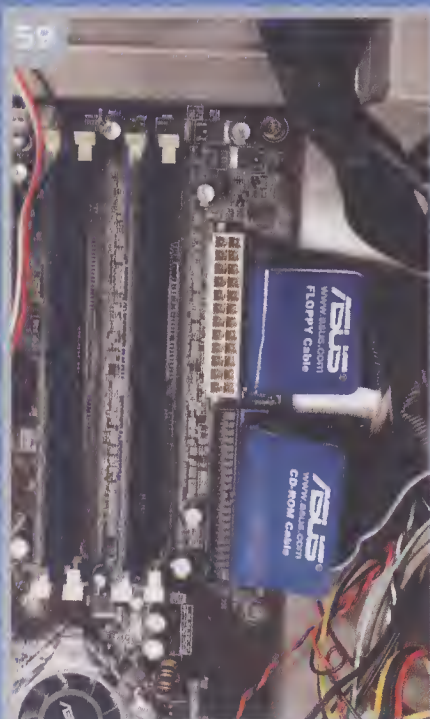


Unlike our hard drive, our optical drive *does* require you to set a jumper (see step 40). Your drive should ship with it set in the Master position, exactly how we want it.

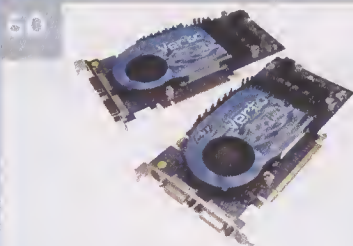
58



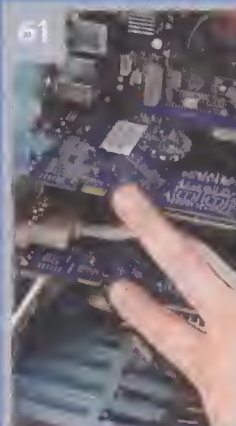
Once you've plugged in your IDE ribbon and made sure that the jumper is set properly, go ahead and slide the drive into place. You'll know it's in when it clicks.



Plug the other end of the IDE ribbon cable into your motherboard's Secondary IDE slot. It can only go in one way. Do not force it but make sure it's seated properly.



Time for SLI! Here are our two sexy, identical-twin GeForce 7800 GTs from PNY -- both of them of the PCI Express variety; they're both going into our PC. Yeah baby!



Our motherboard comes with two x16-sized PCI-E slots and that's where our cards go. Lay your case back down on a flat surface and pop both cards in, making sure to press straight down when doing so.



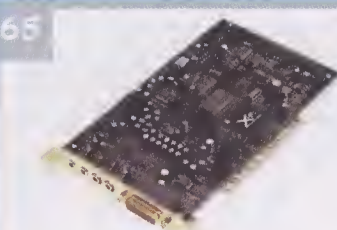
See where we're pointing in step 61? That's where your SLI adapter attaches. This little piece of hardware (comes in the box with your mobo) is how our two video cards are able to talk to each other.



Attach it like so and make sure it's all the way on. You may notice that this adapter doesn't really fit all that snugly, which is a bit worrisome, yeah? Turns out ASUS is aware of this issue...



...And so they include a small metal bracket that attaches to the back of your case and locks the SLI adapter gently and securely into place. Do not forget to install this piece!



Creative Labs' X-Fi sound card is the best they've ever built, and this XtremeMusic card will make a great addition to our new massively multiplayer, ass-kicking PC. (MMAKPC)



We always like to give our cards room to breath and so we've left a PCI slot's worth of room between our bottom video card and our X-Fi. You should do the same.

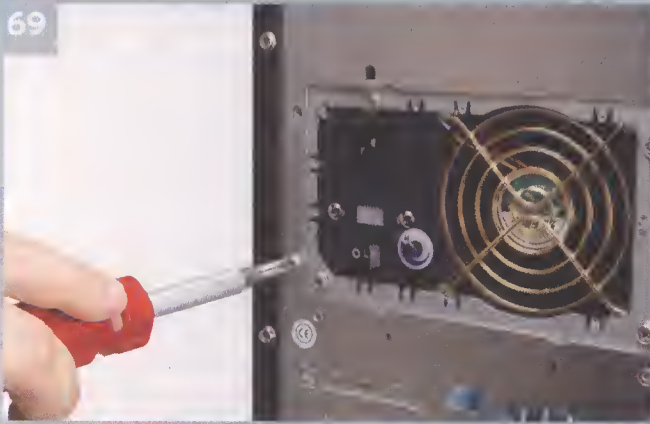


Looking at the back of your case, you'll now notice that you've got two sets of audio ports. If you've installed an X-Fi, ignore the top ports. But if you haven't installed an X-Fi, those top ports are all yours.



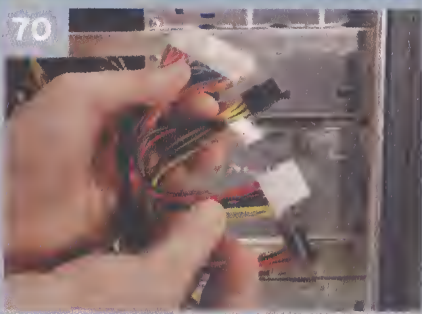
Deep breath -- you're almost done. Let's go ahead and throw our power supply in so that we can prep our components for juicing. Feed the bundle of cables into the case...

69



...Then slide the power supply into place and then lock it down with four screws. The nice thing about this ENERMAX is that it auto-detects where in the world you are and sets itself to the appropriate power lever.

70



These are the different types of connectors that come out of your power supply.

71



Take a four-pronged power cable [Y] and plug it into your optical drive. It'll only fit in one way, and as always, make sure that it's in, but don't force it. (And never jerk it to get it out.)

72



73



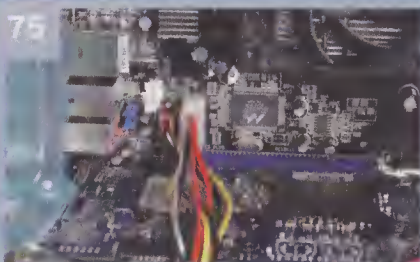
Now take another large four-pronger [Y] and attach it to your hard drive in the same way you did your optical drive. Make sure that the connection is nice and snug.

74



Now take a small four-pronger [Z] and attach it to your floppy drive, making extra sure that you're putting it on properly and not bending any of the floppy's pins in the process.

75



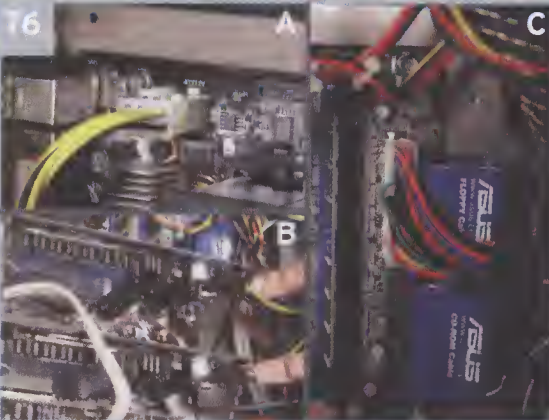
Take yet another large four-pronger [Y] and plug it directly into the motherboard as shown. This gives your PCI Express cards a little bit of extra juice when and where needed.

77

YOU ARE NOW A PC PRO!

Your system will be one sexy son-of-a-bitch when switched on! (Look in the window and make sure that all of your case fans are spinning. Shut down and adjust cables if necessary.)

76



(A) Our motherboard sports a square, 4-pin 12v socket, but our power supply comes with an 8-pin 12v connector. No problem! Simply use the right-most of its four pins to connect to the mobo. It should go right in. Don't force! (B) Our power supply also sports two PCI-E power cords that you'll plug into your video cards. (C) This large, 24-pin power cable also plugs directly into your motherboard.



NEW!

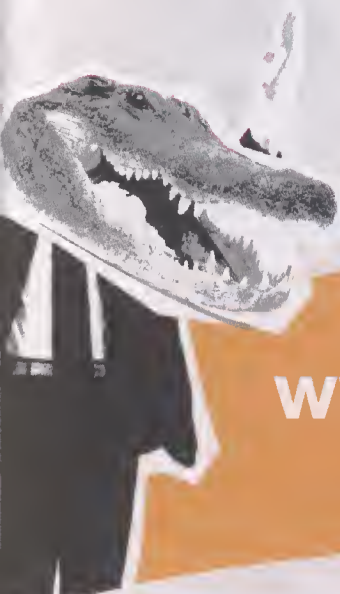


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FROM THE CREATORS OF

PC GAMER



PSM
THE OFFICIAL MAGAZINE OF PLAYSTATION 2 & PS3 GAMES

JESPER HANSEN SHOWS
YOU HOW TO BUILD YOUR
OWN CUSTOM MP3
PLAYER FROM SCRATCH



JESPER HANSEN
GOOD WITH HIS HANDS

A few years ago, when I started building MP3 players, most people I told about my projects had no idea what I was talking about.

Things are a bit different today, to say the least. MP3 players are all around and becoming increasingly cheaper. So, why spend a lot of time building your own, which may end up costing twice as much as a commercial player? Well, why do people climb Mount Everest? Because it's there! And because they can! Owning a player you've made yourself is very cool, and you'll have something different to the commercial ones. It'll work just fine with your PC, too – we've provided a special Windows application on the disc for maintaining playlists and downloading songs to the player. A similar Linux application is also available. Also, both player hardware and software are open source so you can modify the firmware of the player to suit your specific needs and ideas. Follow the tutorial here in *PCG* and start building your yampp today!

Here's what you can expect from the finished yampp-7 player:

- Accepts CF cards up to 4GB (that's about 72 hours of CD quality music).
- Built-in Li-Ion cell allows a playing time of about 24 hours.
- Play all MP3 formats up to 256kbps
- USB 1.1 interface, which doubles up as a battery charger.
- 84*48 pixel graphics display.
- Blue EL-backlight.



Build Your Own MP3 Player

STEP 1

➤ It may be crazy, but it's fun!

Yes, going to the store and buying an iPod is easy, while constructing and programming your own yampp (Yet Another MP3 Player) is difficult. But not that difficult, depending on your experience and determination. As well as the requisite parts, all of which are available from www.jelu.se, you'll need a soldering iron (about 20-50W), with a fine tip. Also, you'll need some small diameter solder or solder paste. A magnifying glass

will help you with the assembly and may be needed to read the component values. A vice or clamp for the printed circuit board (PCB) is useful, as you will need both hands for the soldering. And you'll need a steady hand. You can use hot air if you have the right equipment – a hairdryer or heat gun will NOT work. The yampp players are open source and you can find more info at the yampp website at www.yampp.com.

PUTTING IT ALL TOGETHER



1 Using the schematics and parts list as a guide, mount all of the passive, surface-mounted components on the top side. Leave out the large capacitors C8, C12 and C13 for now as they will be in the way. We will be using EL-backlight, so skip T2, but mount a bridge as shown.



2 Now mount the five ICs – IC1, IC2 and IC4-IC6. Make sure you orient them the correct way and align them carefully over the pads. You can solder a corner pin or two on each to make sure they stay in place, before soldering all the pins for a permanent fix.

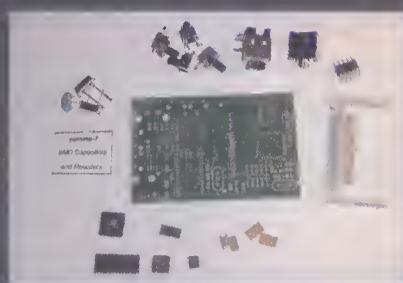
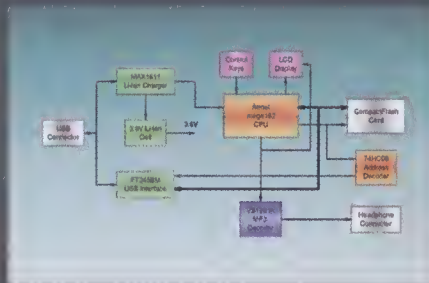
“Why spend a lot of time building your own?... Well, why do people climb Mt. Everest?”



6 Next up is the CompactFlash connector. First cut off the two taps on the front of the connector, so the sides are flush with the PCB. Then solder the pins carefully, making sure you get them all done without any solder bridges. Also solder the taps.

Getting Started

What to expect before, during and after



1 Just to whet your appetite – this is what you're going to end up with after this tutorial. A unique player with great sound quality, long battery life and features not found on other players. And, if you need a special feature, you can always program it yourself...

2 Here is the block diagram, or flow chart, of the yampp-7 player. The complete schematic and other documentation, including a detailed guide, can be found on the coverdisc and on the yampp website. See the website for forum topics too.

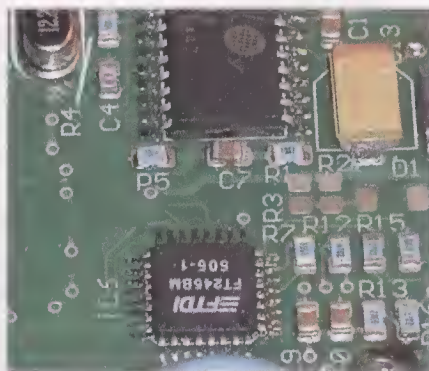
3 Now, this is what the kit looks like. Make sure you have all the parts and sort them so you can find the right capacitors and resistors. The printing on the resistors is pretty small and you'll probably need a magnifying glass to identify them.



3 Next, mount the large capacitors. Note the polarity markings. They are marked with a black line in the negative end, except for IC14, which is a Tantalum capacitor and has its marking in the positive end! Whoever came up with that idea should be flogged!

4 The crystals Q1 and Q2, the resonator Q3, and the programming connector J2 are next. It is very important that the pins of the two crystals and the connector do not protrude on the back of the board, as this could cause a short and ruin your equipment.

5 Here, you'll see how it should look at the back of the board. The connector and crystal pins have been cut totally down before soldering. The CompactFlash card will slide in over them, so it's important they are kept low to enable a snug fit.



7 Almost there, but we need some interfaces to the outside world. Mount the four switches and the USB, headphone, and battery connectors on the underside of the board. Make sure it's all mounted straight, so it will fit the box later.

8 That's it for now. The image above is how it should look. Check your soldering very carefully. Then check it again. And do it once again, just to make sure. In almost all situations where there are building problems with the player, it's due to bad solder joints.

9 This is the finished board, with all components mounted. If you think the surface mount soldering is a bit too tricky, you can buy the pre-assembled board as above and start off with that in the next page's tutorial on how to finalize the player.

JESPER HANSEN SHOWS
YOU HOW TO CREATE A
ROBUST CASE FOR YOUR
CUSTOM BUILT MP3 PLAYER



JESPER HANSEN
GOOD WITH HIS HANDS

I would have preferred the yampp-7 to be housed in a cool shiny enclosure made from aluminium or stainless steel, but for us hobbyists, that kind of luxury usually stays a dream.

Putting your electronic creations into a nice box is what makes the difference, and marks it as a 'finished' project.

I have countless numbers of PCBs in various states of completion, but common to all is the fact that they have no enclosure. Many of them will, therefore, remain permanently unfinished.

When you've finally found a nice box for your device and finished it, you can have it on your desk, lab bench or in your pocket. It can even be moved without a few bits breaking off and acrid smoke rising from the wires and components.

But, the problem with enclosures, at least for small projects, is to find one that suits the project and has the right size. As a hobbyist, you're stuck with what the local stores can supply.

For the yampp-7, this means a plastic enclosure, as usual. But, in this instance I have been pretty lucky to find an enclosure that suits the player pretty well. It's a bit larger than modern MP3 players, but it's small and light enough to fit in a pocket. Build one and check it out for yourself.



Not pocket-friendly and in a state of 'permanently unfinished.'

Build Your Own MP3 Player

STEP 2

➤ Let's solder while the iron is hot!

In part one we went through the assembly of the player PCB. If you thought that was a bit too difficult, don't despair, all is not lost; you can start out with an assembled PCB, and pick up from this step.

In this step we hook the various player parts together; the PCB, backlight, display and battery. Also we give the player a new home in a Teko box, you can pick one up at our site or buy your own.

You will need a soldering iron (about 20-50W), with a fine tip and some solder for electronics work. A vice or clamp for the PCB is useful, as you will need both hands for the soldering. And you'll need some tools for cutting and drilling holes in the box.

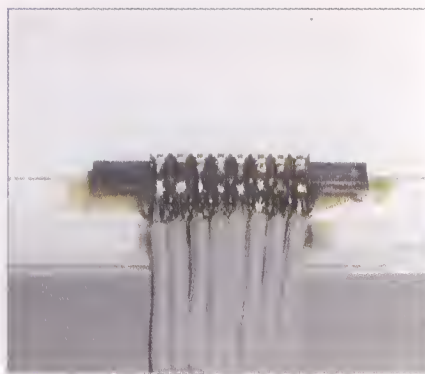
The yampp players are open source projects and you can find more info at the yampp website at www.yampp.com, where you'll also find the yampp discussion forum.

PUTTING IT ALL TOGETHER



1

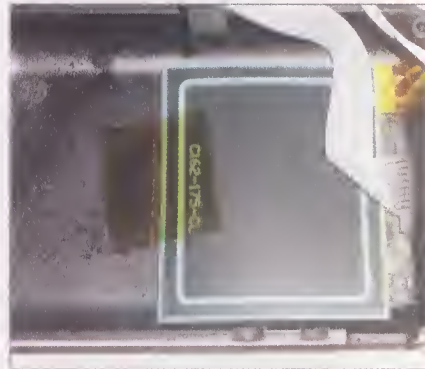
Every electronic device needs a power source and the yampp-7 is no different. To connect the battery to the player, we need to solder on a small piece of wire. Be careful not to use too much heat, and observe the polarity markings on the Li-Ion cell to avoid a nasty surprise.



2

Here is the real test of your soldering skills. The display needs a piece of flat cable or other flexible cable soldered onto the connector. Note that the connector is very sensitive and may break off if you're not careful. So take extra time to be gentle and precise.

"It can even be moved without a few bits breaking off and acrid smoke rising from the wires."



6

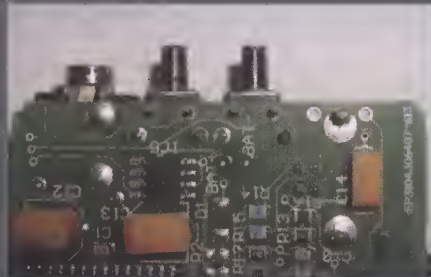
Place the EL-foil against the back of the LCD, making sure you isolate the connections to the foil as they carry high voltages. Failure to do so could end up with you receiving a nasty shock or your player shorting out. Secure the foil with a bit of tape.

Getting Started

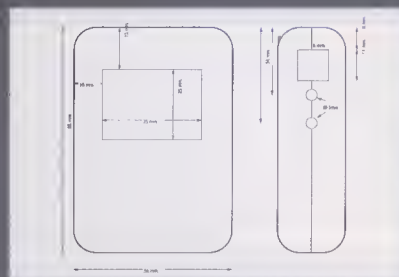
The player in a Tekoshell



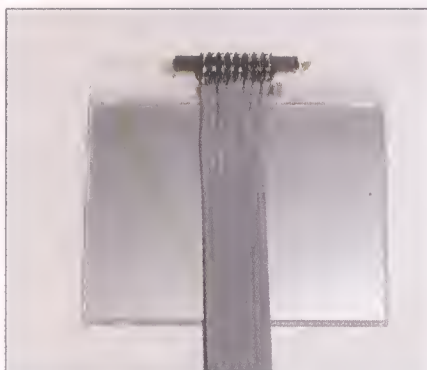
1 Here are the parts you need for this part of the tutorial. This is the complete semi-assembled kit you can buy from the JELU at www.jelu.se. This of course makes things a lot easier and quicker for you, especially if you skipped part one.



2 The PCB needs to have the corners rounded, so it will lock positively into the box. Use a small round file to make a small concave cut in each of the four PCB corners. Carefully file away a little at a time until the PCB just fits into the case.



3 Here is the box drawing, which shows where to drill and cut the box so it will fit the player. Also cut down the PCB stand-offs inside the box, so the PCB will rest stable on the bottom of the box. And remember – measure twice, cut once.



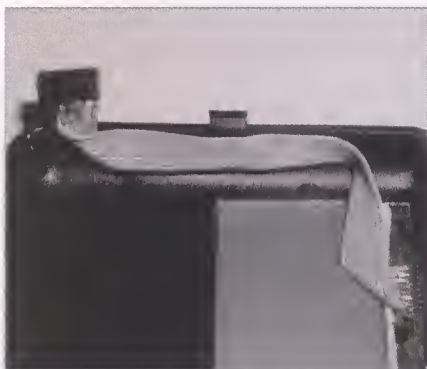
3 Here's another picture of the LCD with the cable soldered on. You now need to mount the small 1D-pin connector on the other end of the cable, making sure the pin numbering is correct. Note: the left most pin on the LCD is pin 1, and the furthestmost on the right, number 10.



4 The EL-driver for the backlight can be mounted in various ways. We chose to mount it on a free area of the PCB. It's mounted on a bit of tape with a drop of contact glue. Use some thin wire to connect the driver board as shown in the picture.



5 Now mount the display in the box. Remember to remove the protective clear plastic on the front and back of the LCD. Use a little contact glue to keep it in place. Do not use superglues as they may make nasty marks on the LCD.



7 Here's a close-up of the LCD wiring in the box. It is critical to get this right, as the display connector may otherwise break off, or the battery may exert pressure on the back of the LCD. Try and secure it neatly without any stress on the connections.



8 Here is a picture of both box halves, again showing how the wires and battery are placed inside the box. Just like the inside of your PC, the tidier it is the more likely it will work, or work better.



9 Just like in food programs on TV, I have already prepared a finished player. This is what you'll end up with after part three, where we'll breathe some life into the player, or electrocute yourself. If you've followed the steps and are wearing rubber shoes you should be fine.

JESPER HANSEN
DISCUSSES HOW TO KEEP
YOUR YAMPP PLAYER
RUNNING FAT FREE...



JESPER HANSEN
GOOD WITH HIS HANDS

Losing fat was always a high priority. Not just when contemplating my personal health but also when designing the yampp player.

The FAT file system is the basic one used in PCs since the days of DOS. There are three variants: FAT12, FAT16 and FAT32. Used for variously depending on the size of the media, such as memory cards and hard drives.

While choosing a well-known file system like FAT for a MP3 player would be great from a compatibility point of view, there are a number of problems:

- It's relatively complex for small CPUs.
- It's ineffective when using large files.
- Long filename handling is quite messy.

Along with this, browsing songs alphabetically and/or searching for songs put huge demands on the small memory-restricted processor.

So, I invented a new file system, which was designed especially for MP3 players with small processors. We made use of the fact that a song transfer and management program would be needed for the PC anyway, so this program could pre-generate a number of specific tables and indexes that the player could then later use for finding things. Also, a number of special features were added that could come in handy.

The new file system was named YADL (Yet Another Disk Layout), and is used in the yampp-3/U and yampp-7 MP3 players. It has proven to be a highly effective file system in the past.



The yampp player is 0% FAT.

Build Your Own MP3 Player

STEP 3

► The final steps

Now that we've gone through the physical assembly of the various parts for your homemade MP3 player, it's time to breathe some life into it. By that, of course, we mean it's high time to load it up with some rockin' tunes! This third and final part of the tutorial describes the steps needed for uploading the main firmware code to the player. Furthermore, it also describes how to use the yamppLink program to download songs.

You can find all of the information you need about using the compiler tools by visiting www.avrfreaks.net and winavr.sourceforge.net.

Of course, the yampp players are open source projects and you can find more info at the official website, www.yampp.com, where you'll also find the yampp discussion forum.

PUTTING THE FINISHING TOUCHES TO YOUR PLAYER

Enter a unique identifier for your new yampp device here. YL will use this string as a subdirectory name to store cached data and playlists for that particular device.

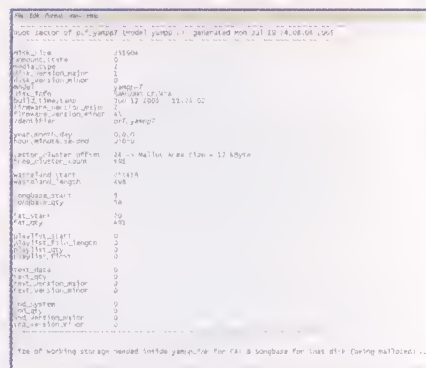
Enter a valid subdirectory name (no special characters please) here with a maximum length of 19:

pcf_yampp7

Cancel

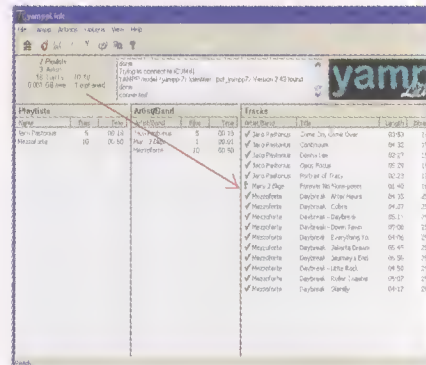
OK

1 Run the yamppLink program again. Click the Connect button in the upper left corner, and you should be presented with the window shown. Here you give your CompactFlash card a unique name, so that your PC can track a mirror image of its contents.



2 When the new card has been initialised by yamppLink, a report will be opened in Notepad. It shows all kinds of information about your player and card. For now, you can ignore it. It's also stored within the card mirror directory for later, in case you need it.

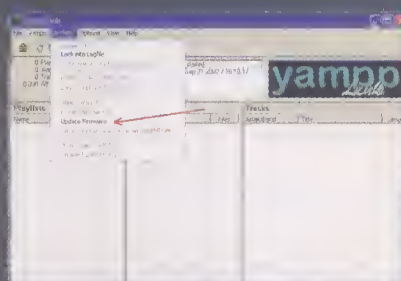
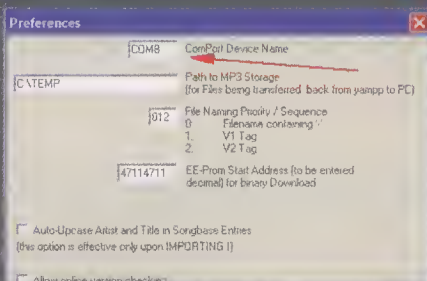
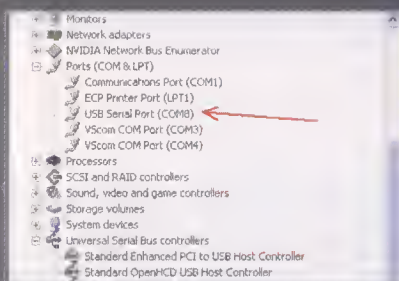
"Now is the time to breathe some life into your home-made yampp player."



6 You can also add single files. These will be called Orphaned Files. When you disconnect yamppLink, files from all existing playlists plus all orphaned files will be added to a 'global' playlist called 'Total', so you can randomly play music from the whole card.

Almost there...

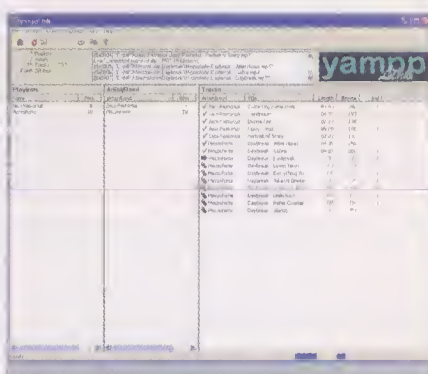
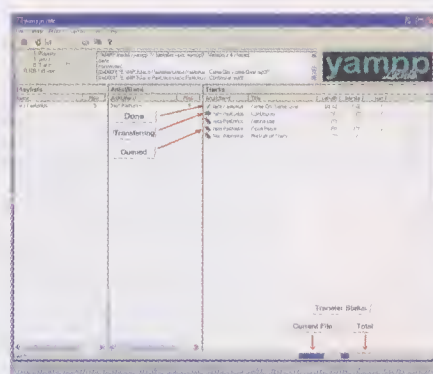
Downloading the main firmware



1 Hold down the top buttons when attaching the battery to enter bootload. Connect the USB cable and Windows will detect and install the Serial Converter drivers. Note the name of your new USB Comport. Never attach the USB cable without a battery.

2 Start the yammpLink program and open the Options->Preferences window. Change the Comport Device Name to the name of your new USB Comport noted in the previous step. You can leave all the other options at their default settings.

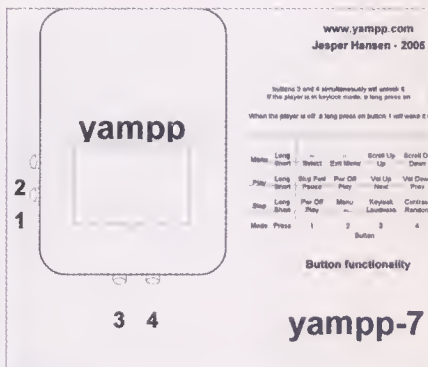
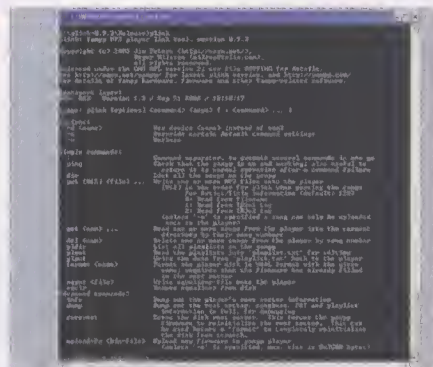
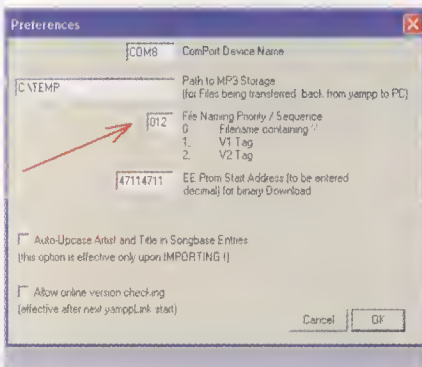
3 Now select the Actions->Update Firmware option. Browse to the yammp7_usb.bin file, select it and click OK. When asked if you really want to burn this firmware, choose Yes. The new firmware will be downloaded to the player in about one or two seconds.



3 You need to make some playlists, in case you don't already have this. You can use Winamp-style M3U playlists, but also easily generate your own with the following command in the directory with the MP3 files: `dir *.mp3 /s /b > all.m3u`. Rename all m3u by artist, like beats.m3u.

4 Now you've got your playlists you can drag them onto the yammpLink window and the files will be downloaded to your almost ready yammp player within a few seconds. There are also various icons to show you the progress of the download.

5 You can continue to add more playlists as long as there is room on your CompactFlash card. In the upper left corner, you can see how much space you have left on the card. Also, note the different divisions - into Playlists, Artists and Tracks in yammpLink.



7 If needed, you can change the parsing of the Artist/Track/Title in Options > Preferences. When all transfers are complete, disconnect from yammpLink by clicking the Connect/Disconnect button. This will transfer the 'Total' playlist. Never just unplug the USB cable.

8 There is an alternative to yammpLink called ylink. It can be used both on Windows and Linux platforms. It is command line based and intended for the advanced user, but at least one graphical front-end has been built for it. Also, it has a few features that are lacking from yammpLink.

9 Here are the button functions for the player in the various modes. It may look a bit complex at first, but it's actually quite simple to use. And, remember, if there is anything in the functionality you don't like, rewrite it! Any questions? Use the forum at www.yammp.com.

How to Recover Your Deleted Files

➤ Recover lost or accidentally deleted files with these handy tools

If you shoot enough digital pictures sooner or later you're going to pull a Homer Simpson and delete an image, folder of shots, or perhaps even an entire hard drive worth of pics that you want back. D'oh!

Not to worry, however: In many cases you can get your priceless shots of lil' Jimmy's toilet-training back, with the aid of a couple of software tools. *Zero Assumption Recovery* is a bit of freeware we like that you can use to recover files and images off of a media card or hard drive. However, if you're looking for a program designed specifically for the task of recovering deleted images from virtually any type of media, we recommend you slap down a measly \$30 for the aptly named *MediaRecover*.

Whichever one you choose, here's how to get those files back.

The Freeware Approach

You're in college and would rather spend your money on Milwaukee's Best and pizza than fancy-pants data-recovery software: We've been there. You're not out of luck, as some decent free options exist, such as the free trial version of *Zero Assumption Recovery*. This slick little program will not only recover deleted images, but many other file types as well. Here's how to use ZAR to get your data back.

1) OPTIMIZE YOUR SYSTEM

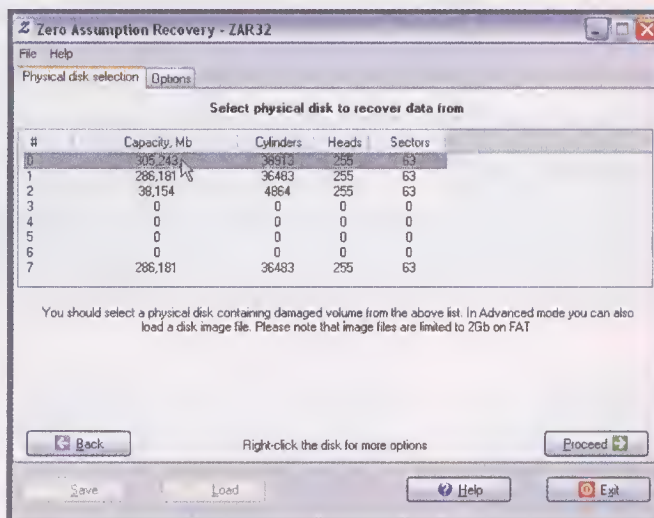
Fire up the program—you can probably leave the default settings alone. If you have more than 1GB of system memory, however, select the Options tab and "Faster method" from the "Volume parameters analysis" pull-down menu. Go back to Preliminary Setup and click the Proceed button.

INGREDIENTS: ZERO ASSUMPTION RECOVERY

Free trial, www.z-a-recovery.com

MEDIARECOVER

\$30, www.mediarecover.com



2) SELECT THE HARD DRIVE TO SCAN

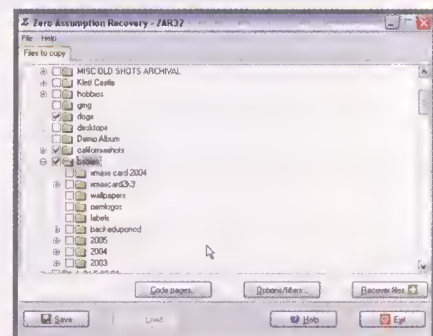
Now, select the drive you want to scan for lost files by clicking it; select Proceed. Next, select the partition on the drive you want to search and click Proceed again.

3) WAIT FOR THE SCAN TO FINISH

Sit back and wait for the program to scan your drive, which might take a long time, depending on the size of the partition you selected. Our 300GB drive took an hour and 15 minutes.

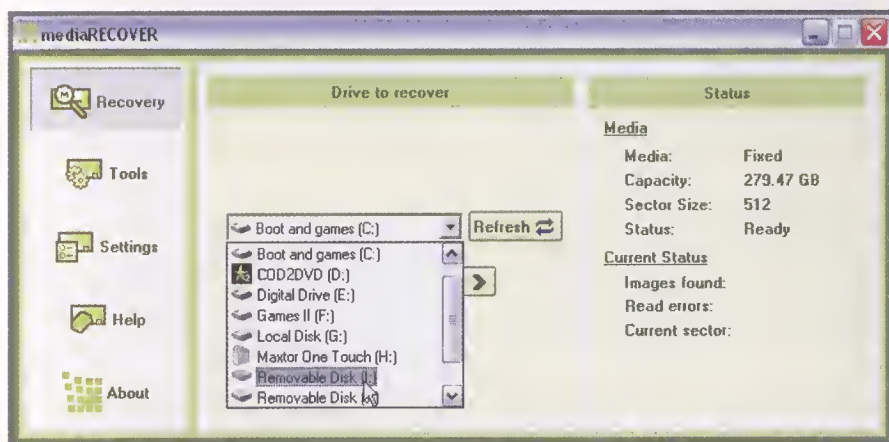
4) RECOVER YOUR FILES

Whoop! If the stars are aligned in your favor, you will be rewarded with your old folder structure, which you can navigate to locate and restore your files. Note: The trial version allows only four folders to be recovered per scan, so you might need to repeat this procedure multiple times—or pony up the \$100 for the full version.



CAUTION!

If you accidentally delete data off of a portable media card or hard drive, stop using it immediately! Do not save or install anything to the drive you want to recover data from, or you could accidentally render your deleted files unrecoverable!



1) IDENTIFY YOUR DRIVE

Insert the CF card into your PC's media reader and select the appropriate removable media drive letter to scan. Click Next, and then select a folder where you want recovered files to be saved. Click Next, then Start, and then select a Scan method (we choose Quick Scan because we're just after deleted photos)—leaving everything else at the default settings—and click Continue.



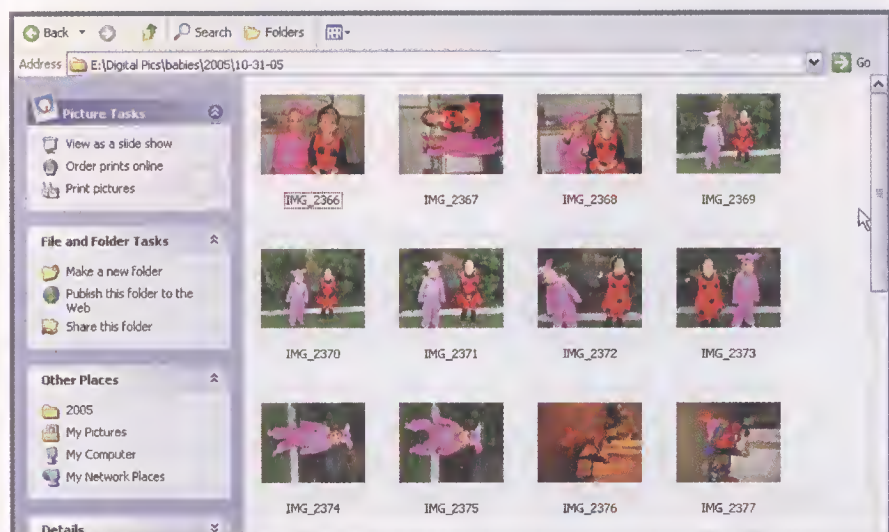
Recover Data from Portable Media

If you accidentally delete photos from one of the memory cards you use in your digital camera (such as a CompactFlash or SD), and you want them back, it's no problem. There are several utilities, including several freeware programs such as ZAR, that will do the trick.

However, when it comes to preserving precious memories, we recommend you don't skimp: Slap down \$30 on *MediaRecover*, which is designed from the ground up to rescue lost media files from hard drives and media cards of all types, including SmartMedia, CompactFlash, Memory Stick, Secure Digital, xD Picture Card, Microdrives, and MultiMedia Card. It does a good job, it's relatively fast, and it's a snap to use. We deleted a few dozen photos off a 1GB CF card and used *MR* to get 'em back—in less than 30 minutes, from start to finish.

2) SELECT THE IMAGES TO RECOVER

The scan commences and a window pops up that displays thumbnails of recovered images. When the scan is complete you just need to choose which images you want to save, and select Save Images. The preview window will close and bring you back to the root menu.



3) SAVE YOUR FILES

The pay-off: Now, simply hit the "Open recovered files" folder and you're done. *MR* opens the folder in Explorer—in Thumbnails view, no less—and you can go to sleep knowing your pics are safe once again.

Chill Out: Water Cool Your PC

➤ Hanging out at the water cooler was never so much fun

Serious overclocking requires serious cooling. We dip our toes into three do-it-yourself water-cooling kits that promise to help you squeeze every last drop of performance from your rig.

Let's face it—today's heatsink-and-fan combos just don't cut it for major overclock-

ing. They're either too inefficient to maintain a stable temperature, or they're loud enough to drown out the footfalls of approaching Combine soldiers. You need water cooling, and you can get it one of three ways: You can buy an expensive, preconfigured water-cooled PC; you can purchase a case with a built-in

water-cooling system; or you can bag yourself a water-cooling kit and install it in the PC you already own. This last approach is the most practical for most folks, but we don't blame you for being apprehensive about accepting on faith that whatever kit you pick will be rugged, reliable, and worth the effort of installation.

Water Cooling In Action

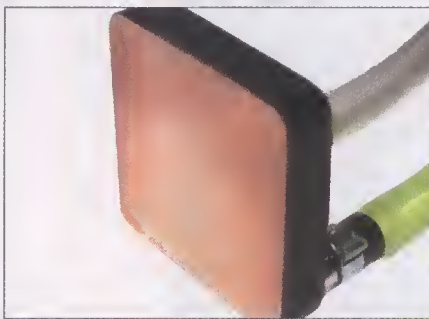
Water cooling is such an easy concept that even dogs get it: Run through the sprinkler on a hot day and you'll cool off. Of course, you can't just hose down your CPU and call it a day. Water-cooling kits operate by pumping water through a closed circuit, wicking away heat from your PC's vital components. Here's how each part in a typical water-cooling kit contributes to that objective.

"Today's heatsink-and-fan combos just don't cut it for major overclocking. They're either too inefficient...or they're loud enough to drown out the footfalls of approaching Combine soldiers."



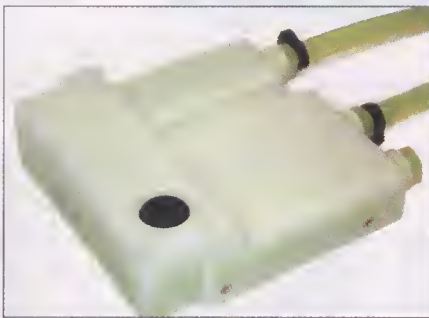
WATER PUMP

The water pump is the engine that pushes water around the circuit. The pump sucks water in through one port and pushes it out another, by way of a motor that spins an impeller. Two primary characteristics differentiate water pumps: The amount of water they can move through the system, and the amount of noise they create in the process. The higher the pump's flow rate and the wider the diameter of tubing the system uses, the cooler your system will be. You want a pump that moves the most amount of water while producing the least amount of sound.



WATER BLOCK

A water block is a copper heatsink that mounts directly to your CPU, GPU, chipset, or other heat-generating component. Water enters the block through an inlet port, and the water is then pushed through small channels that curve around inside the block. This design allows the water to absorb as much heat as possible before exiting the water block via an outlet port.



RESERVOIR

Most cooling kits include a reservoir, which is just a small holding tank of distilled water (usually mixed with additives that promote heat transfer and prevent corrosion). The reservoir is always placed at the highest point in the cooling circuit, above the pump and water blocks, so gravity and pressure can help its contents flow down into the circuit, typically directly into the water pump's inlet port.



RADIATOR

When the water gets to the radiator, it's plenty warm and needs to be cooled. The radiator brings down the temperature by sending the water through a snaking series of interconnected tubes within its fins (the flat surfaces that spike out of the unit). The radiator's fins increase the surface area over which heat is distributed, which helps cool the water inside the tubes more quickly. Meanwhile, a large, high-volume fan, blows cool air through the radiator, wicking away the heat collected in the pipes.

OUR TESTING METHODS

Each kit was installed in a Cooler Master Cavalier ATX mid-tower case, using an Abit AA8XE Fatal1ty motherboard and an Intel LGA775 3.6GHz P4 processor. (All kits tested work with both Intel and AMD CPU models.) We evaluated each kit based on four criteria:

COOLING PERFORMANCE

Once the kit was installed, we measured the CPU temp at idle. We next ran *CPU Burn-in* (<http://users.bigpond.net.au/cpuburn/>) for one hour with a 100-percent load on the CPU, and then measured its temperature at the end of the cycle. To measure the effectiveness of water versus air cooling, we compared the water-cooling temperatures with those from a stock Intel heatsink/fan (HSF) and, alternately, a high-velocity aftermarket fan from Thermaltake—the Jungle 512.

EASE OF INSTALLATION

This is a necessarily subjective measurement, but it's a crucial one nonetheless. We evaluated each kit for the quality of the manufacturer's documentation, how well the kit's parts were

labeled, and how easy it was to install the sucka. This could very well be the deciding factor when choosing among kits that perform similarly.

OVERCLOCKING POTENTIAL

Because water cooling facilitates lower overall temperatures than air cooling, it's often used by overclockers to reach astronomic clock speeds. We tested each kit for its overclocking ability and scored some impressive results, but we did encounter some limitations related to the CPU and motherboard we used. In other words, your mileage may vary.

NOISE LEVEL

One of the big advantages of water—versus air—cooling is that it doesn't require as many notoriously noisy fans. Still, most kits include a fan to draw air over the radiator, and not all of the kits include enough water blocks for all the components you'll want to cool. Once we installed a kit, we measured its sound output from 18 inches away using a decibel meter.



■ The H20-120 uses "cool-sleeve" coils throughout its interior and exterior to prevent the tubing from kinking; kinked tubes will impede water flow and severely reduce cooling efficiency.



■ The internal reservoir is made from molded plastic and conveniently mounts in a 5.25-bay. To add more water, you just pull it out, unscrew the cap, and fill 'er up.



■ The Swifttech VGA water block prior to installation.

Swifttech H20-120

The Swifttech H20-120 kit stands out in this roundup because of its modular design: You can purchase a CPU-only configuration today, and then buy additional water blocks and radiators to expand the system according to your needs. The kit we tested included water blocks for the CPU and GPU, a 120mm radiator with a fan, a coolant reservoir that mounts in a 5.25-inch bay, and a 12V pump. The kit uses 1/2-inch tubing with "cool-sleeve" coils to prevent the formation of kinks that would impede water flow, and it uses green UV-reactive (aka "glow-in-the-dark") coolant that's intended to be mixed with distilled water. One very nice touch is that the 120mm fan/radiator assembly can be mounted on a wide range of exhaust-fan mounts, so it will work with just about any ATX enclosure.

The Swifttech unit is fabulous hardware that performs very well, though installing it is a bit of an adventure that requires extreme levels of

patience and diligence. And the problem stems from the very modularity we praise the kit for: Rather than provide a step-by-step walk-through for the particular kit you've purchased, the H20-120 comes with installation instructions for the entire catalog of Swifttech parts.

As much as we appreciate that Swifttech provides a printed manual—not all the vendors do—we don't appreciate having to wade through 41 pages searching for the nuggets of hard information we need to install something.

The Swifttech kit warns you—perhaps a little too late—that the H20-120 is "for expert users," and they're not kidding. Installation of the kit requires a lot of patience and care, making the Swifttech kit easy to install for those that know what they're doing, but intimidating to the average Joe who is looking to install his first kit. In our opinion, a simple overhaul of the manual would have made this a fine kit for all parties.

TEST RESULTS

PC Gamer Score: 80%
\$260, www.swiftnets.com

Cooling performance

The H20-120 performed quite well, registering the second-lowest temperature delta from idle to full load. Under full load it was only hotter than the stock HSF at idle by four degrees Centigrade.

Ease of installation

This kit wasn't that hard to install, but the 41-page manual would be very intimidating to water-cooling newcomers. All the information you need is in there, but you have to hunt to find it.

Overclocking

This was the best overclocker in the bunch, allowing us to ratchet up our 3.6GHz P4 all the way to 4.126GHz. Not bad.

Noise output

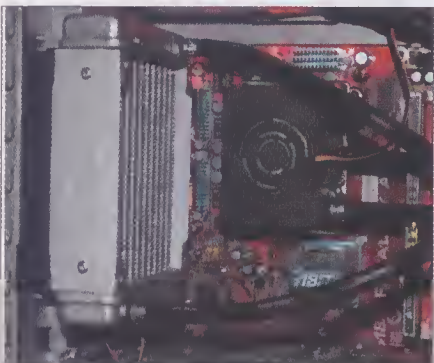
Because the 120mm fan mounts on the outside of the case, noise output increased from the stock HSF by four decibels, but we think that's an acceptable trade-off for the overclocking prowess.



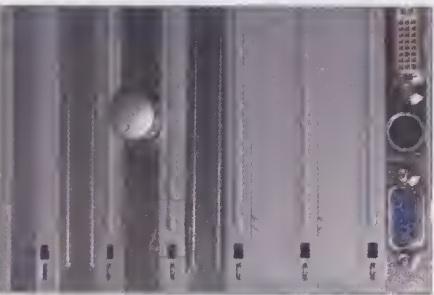
■ The Cool kit certainly looks cool, and it acts cool, too, pumping UV-reactive coolant into an all-black copper water block.



■ Another view of the Cool kit. Looks like it's pumping mutagen from the old *Ninjo Turtles* movies, doesn't it?



■ The Aquagate Mini uses a novel design that integrates the water block with the pump and reservoir. There's no reservoir to fill, no tubing to route, and no pumps to bleed.



■ Another view of the Aquagate Mini.

Corsair Cool

This is a CPU-only cooling kit; as such, it includes just a single water block—VGA and other coolers are not available. The kit also includes a reservoir that can be mounted in a 5.25-inch bay, a 12V pump that affixes to the bottom of your case via an adhesive pad, and a fan and 120mm radiator. The distilled water and UV-reactive coolant are carried via 3/8-inch tubing.

The Cool kit afforded us the second-easiest installation of the roundup, thanks to easy-to-understand instructions and large, full-color photos. A few disappointingly vague instructions are what kept it from being the easiest kit to install: In one example, the manual was missing a crucial detail regarding the orienta-

tion of the water-block retention plate on our LGA775 formfactor processor. When we fact-checked this with Corsair, we were told the manual has since been updated to reflect this important change (fat lot of good that did us).

Corsair includes Swiftech's "Radbox" radiator mounting system, which lets you affix the radiator to practically any size fan mount. Even if your case has only a wee 80mm exhaust fan, you'll be OK—simply ditch the fan and use the mounting holes to install the radiator.

In our tests, the Cool system performed quite well, delivering the second-lowest overall temperature at idle, and the lowest temperature at full load. Amazingly, the Corsair kit's temperature at full load was lower than the stock heatsink/fan at idle (when your PC is doing nothing).

TEST RESULTS

PC Gamer Score: 80%
\$200, www.corsair.com

Cooling performance

The Cool kit is aptly named: It exhibited the lowest temperature drops from idle to 100-percent load of any kit in the test. Its idle temp of 38° C was four degrees lower than the stock Intel cooler, and its full-load temp of 44° C was the lowest in the roundup.

Ease of installation

This kit was the second-easiest to install thanks to thoughtful, step-by-step instructions. Still, there were a few omissions that caused us some serious headaches. And because the documentation is provided only in PDF format, you'll need to either print it out beforehand or follow along on a laptop.

Overclocking

We eeked just a 400MHz overclock—that's only 40MHz higher than we achieved with the stock cooler. This makes the Cool kit the least-impressive of the bunch in this respect, which is odd given its stellar temps.

Noise output

Because this kit requires a 120mm fan to be mounted outside the case, it was four decibels louder than stock.

Cooler Master Aquagate Mini

The Aquagate Mini eschews the pump/reservoir/radiator/water-block design convention in favor of an incredibly simple and compact two-piece cooling unit. There's the typical radiator/fan assembly, but the water pump and reservoir are all integrated right on top of the water block. Thus, the Aquagate Mini significantly reduces case clutter and tubing hassles.

The tubing is factory-clamped and liquid is included, so you never need to fill a reservoir or worry about leakage or mishaps. It's also the only kit here that is meant to be installed entirely inside the case, which significantly

reduces noise levels. Setting the speed-adjustable fan to its lowest setting renders this kit astonishingly quiet.

Installation was the easiest in the roundup, partly because the kit doesn't require you to route any tubing or fill reservoirs, but also because Cooler Master has streamlined the CPU-mounting process into just four small steps. The kit provides all the tools you need to tighten everything down. Mounting the CPU block took about 10 minutes, and bolting the fan to the side of the case took another five minutes—awesome compared with the two-plus hours required to install each of the other kits in this roundup.

The only drawback is that there's no way to add a VGA or chipset cooler to this system down the road. But as far as CPU-only kits go, the Aquagate Mini is our hands-down favorite.

TEST RESULTS

PC Gamer Score: 90%
\$100, www.coolermaster.com

Cooling performance

The Aquagate Mini posted solid scores that were very similar to its competitors'. The CPU got up to 60° C with the fan turned all the way down, but the rig was totally silent and cooler than the stock HSF.

Ease of installation

Installation was a snap—by far the easiest in the roundup. Cooler Master uses an innovative screw-down mounting method for LGA775 formfactor processors that requires just four bolts, which you secure with a tool that's provided in the kit. With that

painless task out of the way, we installed the fan with four screws and were finished.

Overclocking

The Mini registered the second-highest overclock in the test: 4.08GHz.

Noise output

Because it has an adjustable fan, we tested the kit with the fan set on low end then on high. It's totally silent on low, but quite loud when turned up all the way. It's also the only kit that mounts entirely inside the case, which goes a long way toward reducing noise.

9 Water-Cooling Pitfalls—and How to Avoid Them

1. RTFM (read the freakin' manual)

How we learned this: The instructions for these kits aren't printed out just for your amusement—they are absolutely crucial to the kit's successful implementation. Building one of these kits is equivalent to designing a circuit, and every portion from the radiator to the pump to the water block must be correctly installed or there's a good chance the kit will either not function at all or won't function at its full capacity. There were numerous times during testing where we experienced issues with certain kits, and we always traced the problem back to a missed step, an incomplete step (typically due to a murky instruction) or something similar. The point is clear: Follow the instructions as if your PC's life depended on it!

2. DON'T GET KINKY

How we learned this: We didn't experience any severe kinking problems with any of these kits, but we came to the conclusion that the "cool-sleeves" tubing offered with the Corsair and Swiftech kits do an excellent job of preventing circulation-plugging kinks anywhere in the lines.

3. READ AHEAD

How we learned this: When installing the Corsair kit, we performed each step in the process as we read it. One of these steps read "remove one of the [adhesive] pad's protective sheets..." so we did. And then the very next step in the manual said, "do not peel off the protective sticker on the adhesive surface..." Whoops.

4. MAKE A PLAN

How we learned this: We built each of these kits with the water traveling from the radiator to the CPU water block, and had no problems at all; but it would be interesting to experiment with different configurations, such as connecting the water pump to the CPU, to see which works best.

5. HAVE A LIFELINE

How we learned this: One of the kits wasn't booting, and we were convinced we had installed it correctly. We finally asked for help from a co-worker, who walked us through the process from step one all over again. As it turns out, we just needed to look at the directions a bit more closely: For one step, we had been following the directions for installing the kit on what the manual had labeled a "P4." When we turned to the next page, we found a set of very different directions for installing the kit on an "LGA775" CPU, which is also a P4. The previous directions were for a Socket 478 P4.

6. CALL TECH SUPPORT

How we learned this: We were seeing unusually high temperature readings with the Corsair kit, so we contacted the company and asked about it. As it turns out, we had the water block installed correctly, but the retention plate was upside-down. In our defense, the plate looks perfectly symmetrical at a glance, and there was nothing in the manual explaining that the plate had to be mounted a certain way. We would never have figured this out on our own, but a quick call to tech support fixed

the problem quickly and effectively.

7. MEASURE TWICE, CUT ONCE

How we learned this: One of the kits requires a few inches of slack in the line to the reservoir, so we cut it long. This was perfect when the reservoir was pulled out, but when we pushed it back into the case, the line kinked and we had to re-cut it. Cutting the tubing too short would have been an even bigger hassle.

8. DO A DRY RUN

How we learned this: None of the kits recommend doing a dry run, but we think it's a good idea. We recommend assembling the entire kit and running it until the circuit is full of water before you power up your PC. This is a good way to test for leaks! Simply attach just the pump to the power supply, short-out pins 13 and 14 with a paper clip, and turn it on. Water should begin pumping through the system immediately. Once it's full, and no leaks are found, connect the PSU to the motherboard and fire it up.

9. WATCH FOR CAPACITORS

How we learned this: Even though there's a "no build" zone around the processor area, the water blocks are so large they can nudge up against a capacitor and still feel solidly mounted to the CPU. This has happened to us with other kits, and we couldn't figure out why the CPU was running at 100° C. We finally removed the block, wiggled it a bit to make sure it was making good contact with the CPU heat spreader, and reattached it. Problem solved.

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PCG2WC7

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How To Organize Your Digital Music

➤ It's high time to put the shine on your music library with proper MP3 tags and album art!

When Mom wanted you to clean your room, she had a foolproof method of persuasion: Do it, or you'll never see daylight again. Because we can't use the same approach to convince you that keeping a tidy digital audio collection—one with proper ID3 tags and album art—is in your best interest, we'll try reason instead.

You might wonder why you should bother to take the time to clean up your library, given that you've survived this long without properly tagged tracks. But that library is only going to get bigger, and sooner or later it's going to become a major chore to find anything at all. What's more, without properly tagged tracks, you're missing out on the most advanced features of today's hardware and software media players. For example, if you recently got dumped, iTunes will gladly play, on your command, your most highly rated country/western tracks so that you may wallow to your broken heart's content. Or you can throw an impromptu nostalgia party by instructing Windows Media Player to randomly play tracks published in the 1980's in the Rock and New Wave genres.

You're getting the idea, right? You can enjoy your music in ways that simply weren't possible a decade ago, using extremely sophisticated media players that are available for free. But, of course, they rely on well-maintained tags to do their best work.

Finally, rehabilitating your music library is a much easier task than you might think, and software (that's also free) will do most of the dirty work for you. And that's just the way we like it.

INGREDIENTS:
MEDIAMONKEY
Mediamonkey.com



MAKING A FRESH START

An ID3 tag is a metadata container; that means that it contains descriptors for the primary data in a file. In this case, that's the compressed audio track, and the ID3 tag "metadata" includes information such as the artist, album, track title, year of release, and even lyrics! The ID3 standard has been through many revisions, but has essentially settled on version 2.4, which is supported by virtually all media players (hardware and software) made in the last few years. (We absolutely swear that's as technical as we're going to get in this How-to.)

By virtue of it successfully rehabilitating the libraries of several die-hard digital slobs here at *PC Gamer*, we've particularly fond of *MediaMonkey* (from Ventis Media, Inc) which is now at version 2.5.3. Above and beyond being a very well-appointed media player, *MediaMonkey* does a bang-up job cleaning up your ID3 tags. And unlike stuffer applications, *MediaMonkey* is just as happy handling less common compressed-audio formats such as OGG and even the lossless FLAC codec. Download it at www.mediamonkey.com. We're using the free version for this How-To, but for a measly twenty bucks you'll get an Easter basket of goodies like automatic library monitoring and updating, and *MediaMonkey* will even synchronize with your MP3 player (yup, even your iPod) and convert your tracks, on-the-fly, to the format your player supports.

Launch the *MediaMonkey* installer. The first option you'll see is which file formats to associate with the *MediaMonkey* application. If you don't intend to use *MediaMonkey* as your primary media player, uncheck all the boxes. If you're not sure, uncheck them all and try out the player first—you can always associate file types later from the Options menu. Click OK on the welcome screen, and you'll get a dialog box that allows you to select which drives and directories you want it search. At the bottom of this window, you can also tell it what kinds of files you want it to catalog (check the list before continuing to make sure catalogs all your music files; we noted that WAV files aren't selected by default, for instance). Our advice is to select all the file types at the bottom of the window, but be judicious about which drives and directories you search. You don't want *MediaMonkey*, for example, to catalog hundreds of WAV or OGG files from game directories. We're telling *MediaMonkey* to catalog only those files in our My Music folder (*MediaMonkey* will automatically catalog all subfolders as well). If you click on the Options button, you'll be offered a scary complement of them.

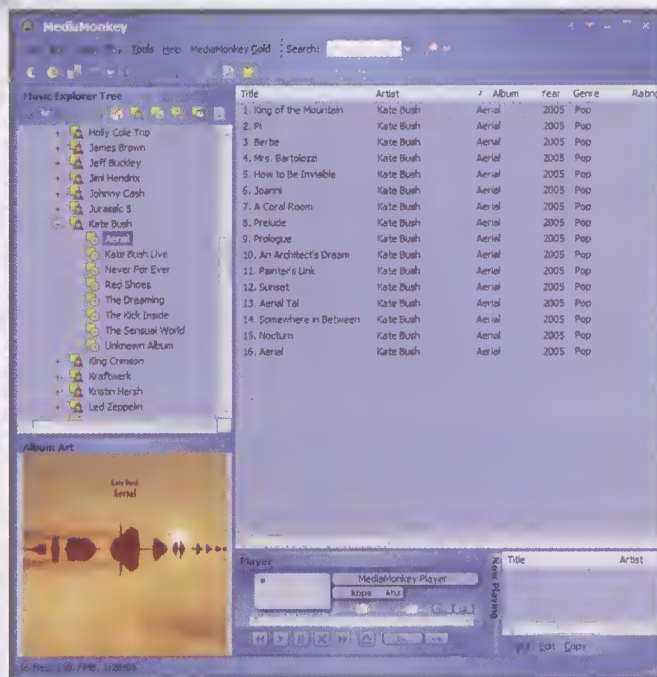
We recommend that you do not change anything at this stage. Close the Options screen if you opened it, and click on OK to initiate the scan.

Scanning will go faster than you think; it'll catalog a IOGB library of about 3,000 tracks in less than a minute, for instance. When it's finished, you'll be introduced to an extremely cool feature—*MediaMonkey* offers to import ratings and playback history data from *iTunes* and *Windows Media Player*. You may accept or decline.

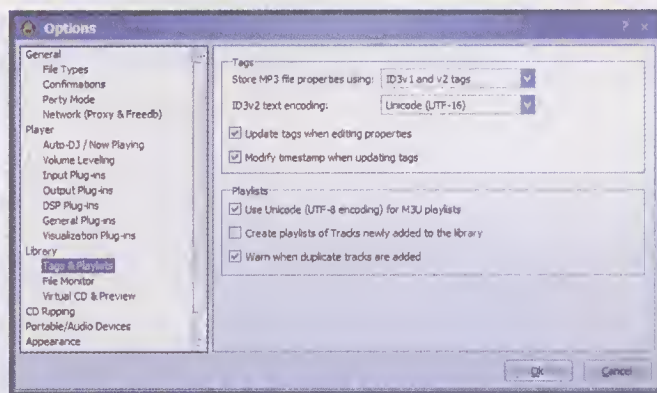
OK, that's round one. Not so bad so far, eh?

LET'S GET REAL

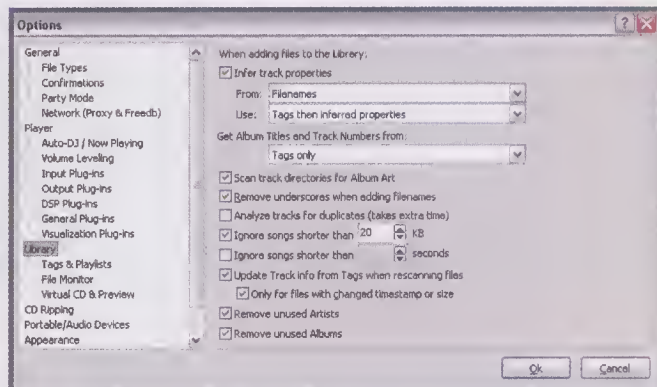
As an auto-tagging application, *MediaMonkey* is not a panacea. No application is, free or commercial, and in fact you wouldn't want an application to act like one and do everything for you based on its own judgment. That's because the application will at some point have to do some guesswork, and it will likely guess wrong. As a result, AC/DC will make a surprise appearance in your Chopin playlist, or worse, mislabeled tracks will be forgotten about and never heard from again. Oy! We're outlining here what we think is the best approach, which is to let applications like *MediaMonkey* take care of the drudgery of handling your easily tagged tracks, and leave you to monitor the rest of the process more closely.



MediaMonkey takes most of the agony out of cleaning up your music's library tags.



Don't freak. Nothing needs to be changed here at this time.

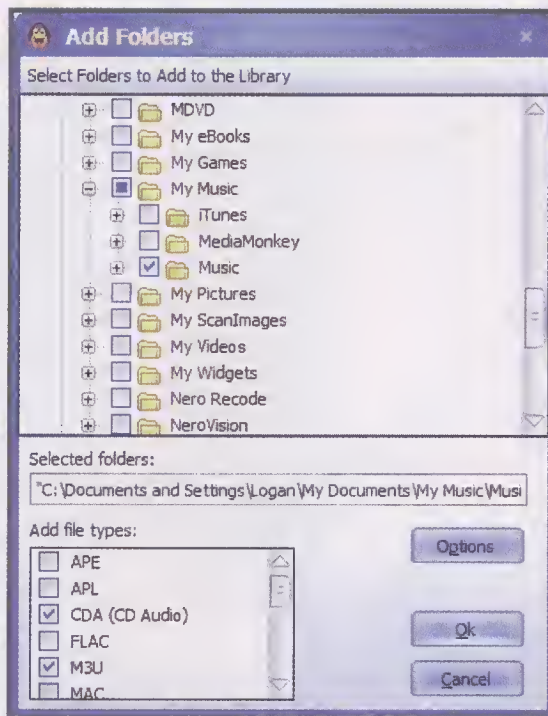


...but later on, you'll want to explore some of the extra features, such as creating tag data from folder names.

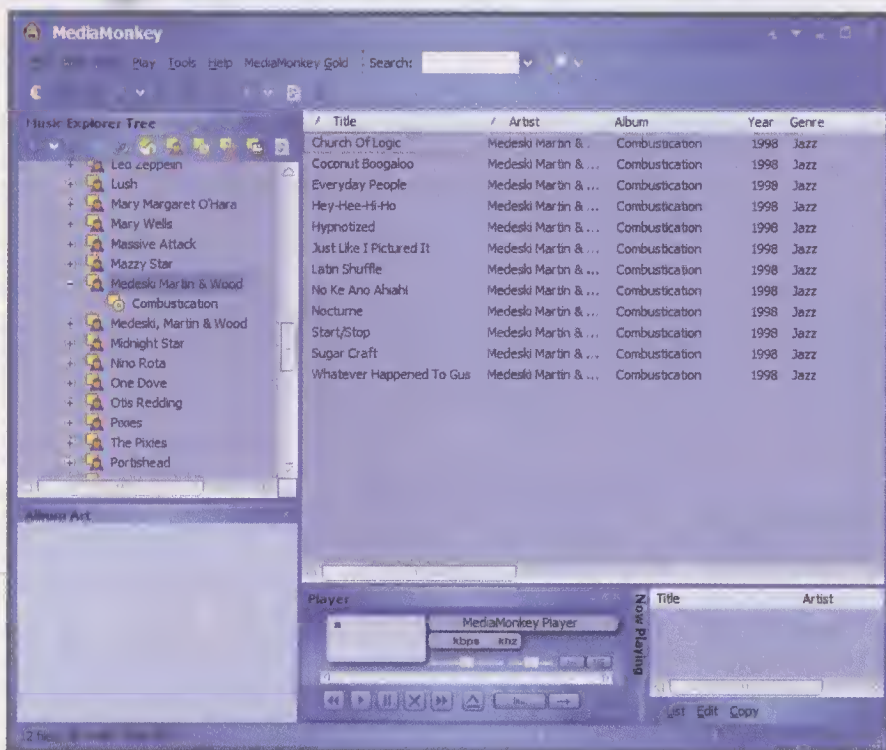
BAG 'EM AND TAG 'EM

Now that *MediaMonkey* has catalogued your tracks, it's time to start tagging. The bad news is that you'll have to tag each album one at a time. But as we mention in the "Let's Get Real" sidebar, doing a batch operation on your whole library will introduce errors that will be a colossal drag to find and fix.

How you want to approach this is up to you. You could, for instance, tag albums as you listen to them, or better yet, you could spend a little time each day going through your artists in alphabetical order and tagging each album. Here's how it's done in *MediaMonkey*.



You can select any combination of directories for *MediaMonkey* to scour on its hunt for your audio files.



The tags here could use a little fixing up, and some album art wouldn't hurt either.



THE PLIGHT OF ORPHANS

No matter what you do, there will always be orphaned tracks that might not have the artist's name in the filename, or worse, might just be called "Track 9." In technical terms, this is known as "life." Maybe you ripped a single track from your CD and didn't tag it. Maybe you downloaded these through a band's website that didn't have the savvy to tag the tracks properly (sadly common). Maybe it's something a friend gave you.

The proper approach would be to devote a day or two (or three) to listen to and properly tag these orphans. If you have more than 25 orphans, we all know this isn't going to happen. But you can consolidate them into one folder (we call ours "Singles"), and attack a handful of them whenever you have the time and inclination.

Yes, it's a drag. But remember, untagged tracks are going to be forgotten as our media players rely more and more on tags for searching and playlist creation. One positive side-effect of this distributed drudgery is that, in the future, you're more likely to tag tracks immediately after downloading them!



Give orphaned tracks a good home; your MP3 player will thank you for it.

Let's say you're tagging a record by Medeski, Martin & Wood called *Combustication*. What a coincidence—that's the one we're looking at here! Now let's make *MediaMonkey* do the bulk of the tagging for us. Click on the album so that its tracks are displayed in the right-hand pane. The tags as displayed in this pane don't seem to be in horrible shape, but the year tags are inconsistent (weird), and we're not buying that this is a hip-hop record. Pull down the Tools menu and click on "Auto-Tag from Amazon". That's right, *MediaMonkey* hits up Amazon.com not only for tag information, but album art as well! If the Auto-Tag menu item is grayed out, make sure that your record is highlighted dark blue in the left-hand pane and try again. If *MediaMonkey* made the correct match, you'll see the album listing from Amazon.com and the album art (you may have to select the proper title if multiple hits were received among similar titles). Now click the Auto-Tag button at the bottom of the window.

MediaMonkey will ask you where you want to save the album art. You have the option to save it within the track metadata, which sounds awfully convenient. Unfortunately, few compressed audio formats support this feature, so it's rather pointless. We recommend saving the album art in the album directory (as shown), but you can also choose to save all your album art in a single directory.

Amazon.com's database corrected the year in our tags, but left the genre as hip-hop, and one of the track name's has a typo. To fix a problem with a single track, right-click on the track and select Properties. Now, right-click and select Properties from the pop-up menu, and you'll see the screen above. Note that Amazon.com lists the track title as one

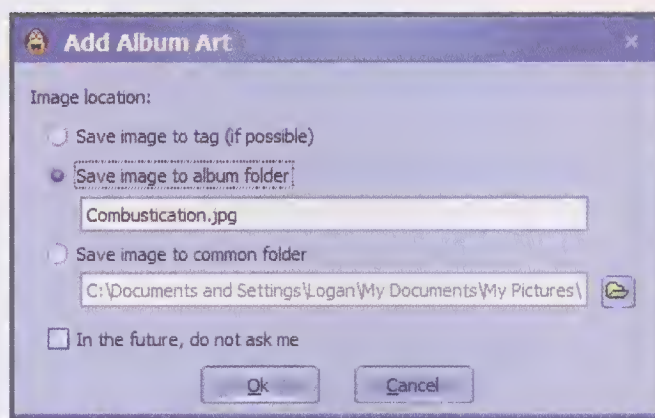
word, Sugarcraft. Wrong—it's two words, doofuses! Simply click in the track title area to edit this property and click on OK. Don't bother changing the genre; we're going to change the genre for all the tracks at once. To do this, click on the first track, hold down the Ctrl key, and then click on the last one to select them all. Then follow the same procedure as above to change the genre.

Congratulations! You've just cleaned up your first record, a process you'll only have to go through once, and then only on those albums that lack proper tagging (which, if you ripped your albums from CD, should have been tagged automatically by your ripper anyway). Now, armed with this knowledge, tackle the rest of your collection—today, before things get more out of hand. You've been warned.

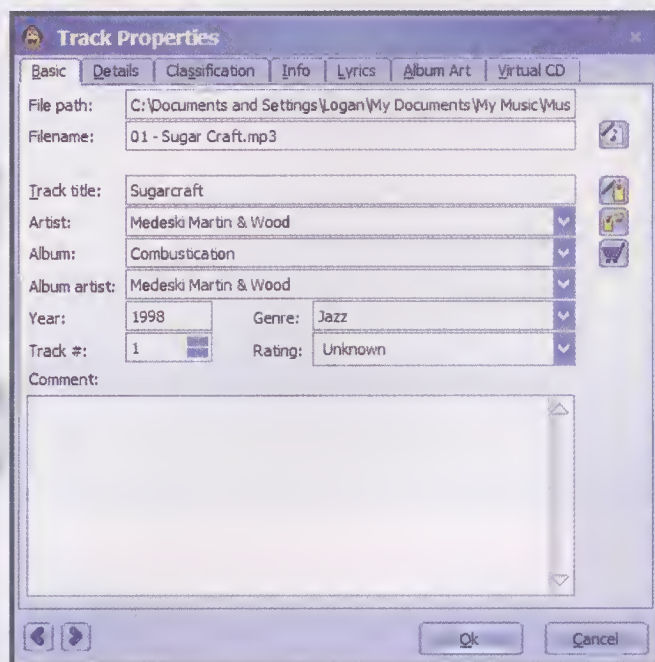
LET THE TAGS BE YOUR GUIDE

Here's a winning reason for audiophiles to maintain good ID3 tags. It may seem redundant, but we recommend that you rip each CD twice, once at 192Kbps for portable players, and again at 320Kbps for playback on a fancy-pants home-stereo system with higher fidelity.

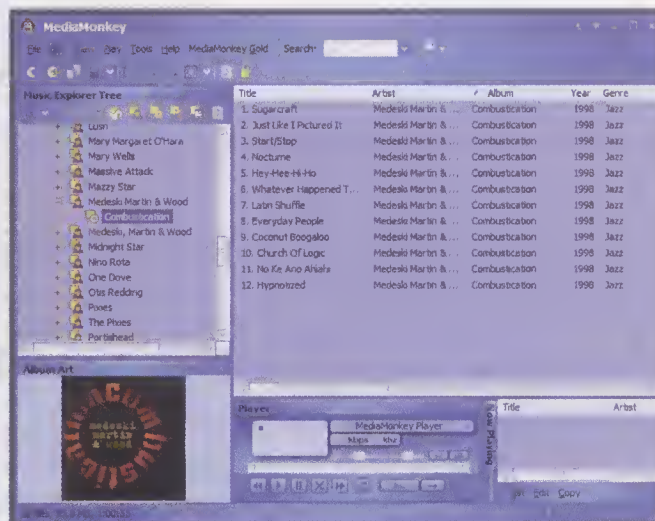
It doesn't matter how you name the tracks; you can name the lo-fi track *Boo.mp3* and the hi-fi track *Boo2.mp3* or *Boo Hiband.mp3*. Remember, the file names don't really matter. A properly tagged album will allow you use your media player to create a playlist from an album or several albums with tracks whose tags indicate their bitrate is 320Kbps, or whatever you specify.



Not many formats support album art within the audio file itself, so avoid saving the album art in the track metadata.



Imported track data can be incorrect, so a little manual labor is bound to be necessary from time to time.



Nice, clean tags and album art – much better.

Get the Most from Your New LCD Monitor

➤ Give your new display a thorough test drive

So you finally took the plunge and purchased a brand-spanking-new flat panel. Good for you! But before you pat yourself on the back, there are a few things you should do to ensure an optimum experience.

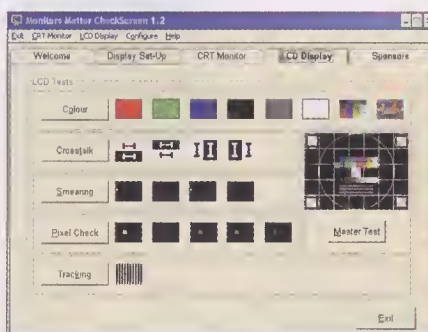
If there is anything wrong with the LCD, you want to catch it right away in order to take advantage of the resellers' quick-exchange program, or at least have it repaired within the warranty period. Here's how to give your LCD the once-over:

STEP 1 Once you pull the LCD from its packaging, make sure you've received all the "included" parts and cables, and check the panel for any surface flaws—scratches, nicks, discolorations, etc.

STEP 2 Test all of the display's various inputs—DVI, VGA, S-video, etc.—to make sure they are functioning.

STEP 3 You'll want to check the screen quality, of course, but only after the monitor has been running for at least 30 minutes. It can take that long for a monitor to warm up to its peak performance. It's also helpful if you conduct your evaluation in a dark environment—ambient lighting and glare can affect what you see onscreen.

Install the *Monitors Matter CheckScreen 1.2* utility (download it from the Meko Ltd. home page (www.benchmarkhq.ru/english.html?be_monitor.html)). Launch the app, and click the LCD Display tab. Cycle through all the solid-color test screens. In combination, these screens will reveal the uniformity of



■ Monitor Matter's LCD tests will reveal any flaws in a screen's quality.

the screen's backlight (look for spots that appear dimmer or brighter), shading irregularities (pay particular attention to the corners and edges of the panel), and any intensity variations in the primary colors.

These screens also give you an opportunity to check for bad pixels. By systematically scanning the various colored screens up close, from side to side and up and down, you're sure to discover any pixels that are stuck in either an on or off position. (You'll notice that the application provides separate test screens for this purpose, but we find the solid screens just as effective.)

If you plan to use your LCD for gaming, use the Smearing screens to check for any problems the screen might have reproducing fast-motion content. Unacceptable results might not mean the LCD is faulty, per se, but you might still be able to exchange the LCD for a more gamer-friendly model.



FINE-TUNE YOUR LCD

Once you're satisfied that your flat panel isn't defective, take the time to familiarize yourself with the onscreen controls. Try out the various presets and/or color temperature options with different types of content. Don't be afraid to experiment—you can always revert to the Auto/Factory preset if you screw up.

Use the *Monitors Matter Master Test* pattern as a basis for manual adjustments. The large outer frame should fill the whole screen, all the boxes within it should appear perfectly square, and the circles should appear perfectly round, not oval. This is a test of the screen's aspect ratio; if necessary, make adjustments using the display's Size, Position, or Centering controls, and make sure you're running the monitor at native resolution.

The background of the screen should appear black, not dark gray. Decrease the Brightness to achieve this result, trying not to lose the darkest gray on the color bar. Similarly, use the Contrast control to achieve an acceptable white without washing out the lightest gray block.



■ Don't be afraid to fiddle with the onscreen controls. If you muck something up, you can reset to default settings!

DISPOSE OF YOUR OLD CRT

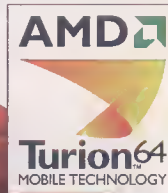
Assuming your CRT is no longer of use to you, it's only right that you dispose of the honking beast responsibly—a street corner or dumpster is not an option.

If the monitor is still functioning, donate it to a charitable organization such as Goodwill Industries; if it's not, we know of no better recycling program than Dell's. Regardless of the brand, Dell will take your old PC gear off your hands for just \$10 per 50 lbs. Go to www.dell4me.com/recycling for more information.



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Make Your Loud PC Whisper Quiet

➤ And at 3 a.m. no one will know you're not in bed



Gigabyte's G-Power CPU cooler offers great performance without a noise penalty—its fan runs at a near-silent 21dBA.

1 CPU COOLING

The CPU is usually the hottest component in today's PCs; as such, it typically requires the most extravagant—and often the noisiest—cooling apparatus. Reducing the amount of noise emanating from your CPU's cooling system is a huge step toward muting your machine, so let's examine this hotspot first.

Our two favorites—Cooler Master's Hyper 6+ and Gigabyte's G-Power—are exceptionally quiet while providing frigid temps. If you're using a stock cooler or an aftermarket unit that sounds like a Hoover, upgrading to one of these silent wonders will bring joy to your ears. Both cost less than \$50, so they're an upgrade anyone can afford.

Water cooling is another way to reduce both CPU temps and overall noise levels (see page 58 for a lesson in water cooling your PC). It takes care of the heat around your CPU, making a rear exhaust fan—a major source of noise—unnecessary in most cases. Unless you're a serious overclocker, however, water cooling probably isn't worth the time, money, and effort. You can usually achieve quietude with a massive heatsink/fan contraption.



Antec's TriCool fans let you select one of three fan speeds. Some case fans include thermal probes and will automatically adjust fan speed as temperature rises.

2 CASE FANS

Much of the noise your PC produces comes from the fans whirling away inside it. Choosing the appropriate type and size of case fans, therefore, is a critical step in any PC-silencing venture. As a general rule: bigger is better; larger fans don't need to spin very fast to move lots of air. Small fans, or those running at higher rpms, generate a great deal of noise. A slow-spinning 120mm fan will always be quieter than a fast-spinning 80mm fan, and both can provide the same amount of cooling.

These days, our favorite case fans are Antec's TriCool series. Offered in both 80mm and 120mm sizes, they're equipped with switches that enable you to set their rotational speeds to 1,200, 1,600, or 2,000rpm. Vantec's Stealth series and Panasonic's Panaflo fans are also very popular with PC enthusiasts.

When shopping for a fan, you should always evaluate the volume of air it can move (expressed in cubic feet per minute, or CFM), and the amount of acoustical noise it produces (expressed in adjusted decibels, or dBA). In a perfect world, you could buy a fan with an ultra-high CFM rating and zero dBA output; but because that's impossible, seek an acceptable middle ground: a fan that can generate 40CFM of airflow while producing 30dBA of noise will provide adequate cooling and remain nearly silent.



If you're not willing to buy a new, "silent" case, your best option is to install sound-dampening material inside your current enclosure.

3 THE CASE

There's not much you can do to make your case quieter, aside from adding acoustic absorption mats to its side panels to dampen the high-pitched whine from fans and drives. We've sampled a few of these mats, including Dynamat and Akasa's Paximate, and they work well. But you should keep in mind that they also increase case temps a bit.

If you're in the mood for a new case anyway, we recommend purchasing one specifically designed for silent operation: Antec's Sonata II, for example, or its new P180, which is outfitted with TriCool case fans and noise-reducing triple-layer side panels.

A slow-spinning 120mm fan will always be quieter than a fast-spinning 80mm fan, and both can provide the same amount of cooling.



Hard drive enclosures like this Cooler Master model quell drive noise by reducing the amount of vibration transferred to the case during operation, and by using a teeny, silent fan to cool the drive.

4 MAGNETIC AND OPTICAL STORAGE

Aside from fans, your PC's hard drive is one of its noisiest components, but it's traditionally difficult to silence. One solution is to place the drive inside a padded and sealed anti-vibration drive enclosure. This will reduce its noise profile and restrict the amount of vibration the drive transfers to the case. Using this type of enclosure will also allow you to remove the intake fan from the lower-front of most PCs. Alternatively, you can buy some cheap rubber O-rings at a hardware store and use one on each of the four mounting screws.

If you're looking to replace your hard drive altogether, the introduction of fluid-bearing spindle motors has rendered modern hard drives exceedingly quiet. For even further quieting, Hitachi's DeskStar drives come with a unique software utility that will slow down the drive's seek time for near-silent operation.

Silencing optical drives is nigh impossible; your best option is to upgrade to Samsung's model TS-H552U. Thanks to a fluid-bearing spindle motor, this is the quietest drive we've ever tested—it's whisper-quiet even at full speed!



Fanless PSUs are fabricated using aluminum heatsinks. They can become extremely hot during operation, but they're absolutely silent.

5 POWER SUPPLY

If you want a zero-decibel PSU, the only solution is a fanless model. Antec's Phantom series, Thermaltake's PurePower, and Silverstone's Nightjar PSU all use large passive coolers instead of noisy fans. We discovered that fanless supplies don't work well with fanless water-cooling setups—with absolutely no air circulating around the CPU area, the capacitors, memory, and MOSFETs on the PSU get way too hot.

If you're not ready to buy a new power supply, installing rubber gaskets where the PSU mounts to the case will at least reduce the amount of vibration (and noise) that's transferred from the supply.



Thermaltake's HardCano 13 controls up to four case fans automatically, spinning them softly at idle and furiously during gaming.

6 FAN CONTROLLERS

Who says your case fans must spin at a constant velocity? Connect them to a fan bus and you can spin them up while gaming or tasking your PC with other high-load chores, then spin them down to reduce system noise when the PC is idle. You'll see many such devices on the market.

Thermaltake's HardCano is one of our all-time favorite fan buses. The HardCano 13 comes with a set of thermal probes that you can mount in various areas in your PC. Connect your system fans to the device and they'll spin up and down as the probes report temperature increases and decreases. You can even set thermal alarms for each probe. Now that is cool (pun intended).

VIDEOCARDS

The cooling contraptions on many of today's videocards are insanely loud, and if you're going for full-monty performance, you should stick with the stock cooler. Low-noise videocard cooling solutions are generally designed to handle midrange cards—not dual GeForce 6800 Ultras in SLI. The only quiet solutions we've seen for high-end videocards are water-cooling setups with water blocks, pumps, and so forth. While it's acceptable to put a 5-inch-tall copper heatsink on top of a CPU, a videocard's clearance requirements limit your options—you don't want to block adjacent PCI Express slots. The primary objective of most VGA-cooler designs, therefore, is quiet operation as opposed to super-cool operation.

If you're running a midrange card and can't stand the noise, here are a few options: Zalman and Thermalright both manufacture VGA coolers that are essentially massive bolt-on heatsinks equipped with slow-spinning fans (we've tested Zalman's, and it worked just fine on our vanilla GeForce 6800 card). There are also several fanless VGA heatsinks on the market, including Thermaltake's Schooner. The Schooner uses heat pipes to move heat away from the GPU core and into an aluminum heatsink that wraps around both sides of the card.

How to Clean Your PC

➤ Keep your PC — and your peripherals — squeaky clean and dust-free



■ Blow the dust bunnies out of your computer's interior with a can of compressed air, but take care not to touch any of the components inside.

Sometimes, you just need to sit back and survey the landscape before you dive into your next project. When's the last time you filed your bills and other important correspondence, deleted old email, optimized your computer's hard drive, or performed any of the other chores that are essential to any smooth-running operation?

Spend a little quality time on housekeeping chores, and you'll spend a lot less time dealing with unproductive downtime because you can't find what you're looking for; or worse, because your PC is on the fritz.

HOUSEKEEPING TIPS

Even if you enjoy the luxury of having a house-cleaning service take care of the cleanliness of your home or home office, they're not going to take care of your computer's hygiene needs—nor would you want them to. But dust is one of your PC's biggest enemies.

Over time, the cooling fan that keeps your PC's internal components at a reasonable tem-

perature can pull huge amounts of dust, lint, and other garbage inside the case.

Some of this detritus will settle on the electronic components inside the case, reducing the computer's ability to cool itself. And if your computer overheats, it's eventually going to fail, putting your valuable data at unacceptable risk.

Your first instinct might be to stick a vacuum hose next to the vent, but that cure is actually worse than the disease. The best thing to do is open the case—taking care not to touch any of the electrostatic-sensitive components inside—and blast away the dust bunnies with a can of compressed air. (You'll find this product at just about any computer or office-supply store.) Once the dust has settled and you've closed up your computer's case, then you can vacuum the dust off the floor.

When it comes to PC maintenance, a can of compressed air is one of the best investments you can make. When you're done blowing out your computer's innards, aim the nozzle at the

ventilation slots on your monitor, too. And then start blasting away at your keyboard.

Next, disassemble your mouse, take out the ball inside (unless you have one of the newer optical mice), and give the inside of that device a couple of blasts. You might also want to take a cotton swab dipped in denatured alcohol (an ammonia-and-water solution will work, too) and clean the rollers inside the mouse. Clean any dust or lint off the mouse ball before you drop it back inside.

To clean your keyboard, simply tilt it upside down so that any loose debris falls out. Use the compressed air to blast out any stubborn bits. You can use an ammonia-and-water solution to clean any grime that's accumulated on the keyboard; alternatively, office-supply stores sell pre-moistened anti-static towels that will also do the trick.

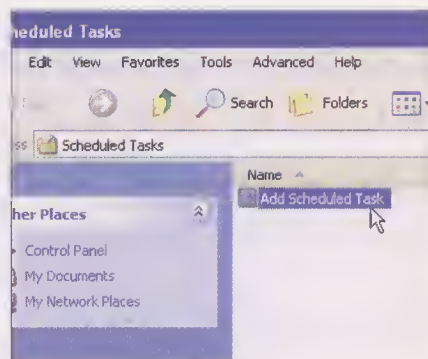
Use the same technique to clean your monitor, but under no circumstances should you open the monitor's case. This is especially true of a CRT (Cathode Ray Tube) monitor, which contains high-voltage components.

AUTOMATED DISK CLEANUP

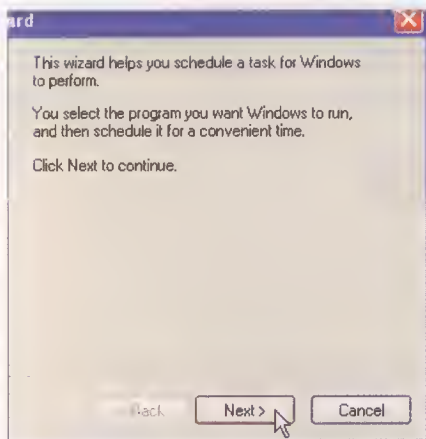
Just as with a maid service, you can schedule Windows XP to do some cleaning on a regular basis. In this exercise, we'll use the Scheduled Tasks Wizard to automatically schedule a disk clean-up.



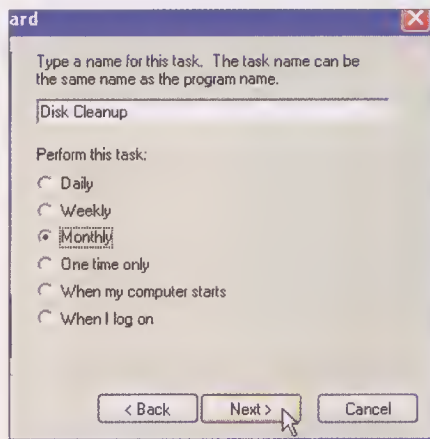
1 Click on the Start menu, point to All Programs, Accessories, System Tools, and then Scheduled Tasks.



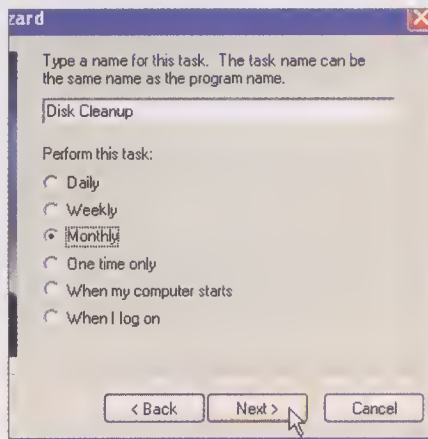
2 Double-click on the Scheduled Task menu item in this window.



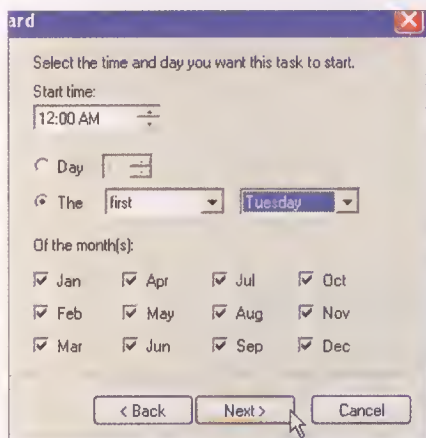
3 When the Scheduled Task Wizard appears, click on Next.



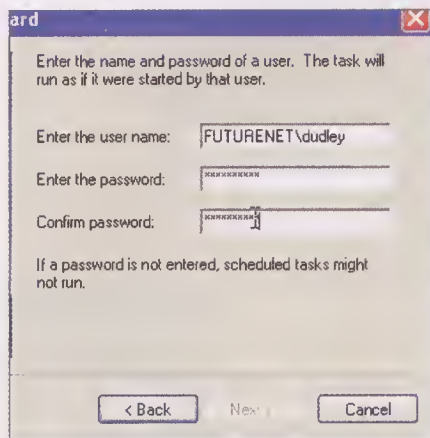
4 Scroll to the Disk Cleanup item. Select it; then click Next.



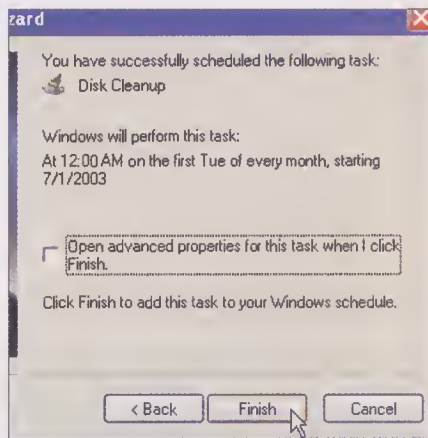
5 Give the task a name, and then select how frequently you want your disk cleaned. Click Next.



6 Indicated what time you want the disk cleanup performed (pick a time when you won't likely be using the machine). Click Next.



7 Enter your log-on user name and password, and then click Next.



8 Click Finish and Windows XP will automatically clean up your hard drive on a regular basis!

How to Set Up a Wireless Network and Secure It

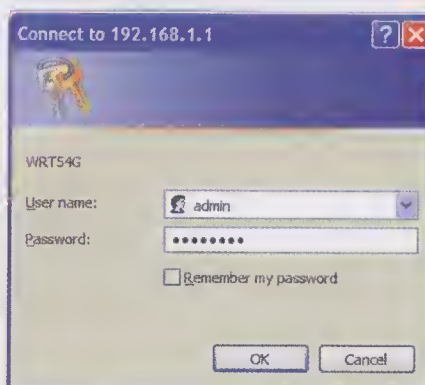
➤ So you can run around the house naked with your laptop...if you wanted to

PLUG IN YOUR ROUTER



1 Your router is a wireless gateway to your Internet connection, so you'll need to plug at least one thing into it. Typically, this will be your DSL or cable modem. Just connect the Ethernet cable from your modem into the port marked Internet or WAN on the back of your router.

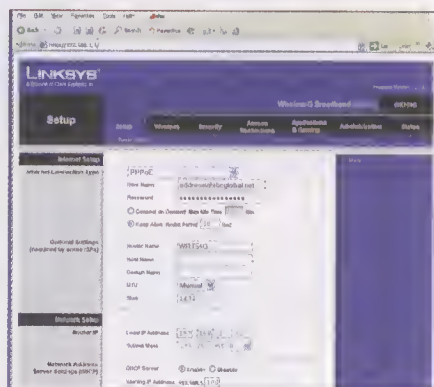
LOG IN



2 Many routers come with an installation CD that will guide you through the setup process, one step at a time. This makes setup a snap. If yours doesn't have one, or if you'd like to get a better look at your configuration options, log into your router directly through Internet Explorer.

Every router has an IP address, usually starting with 192.168.X.X. To find the address for your router, check with your manufacturer. Most companies include this in the first few pages of the product manual. Type the IP address, such as 192.168.1.1, into the address field of Internet Explorer, and enter the admin username and password into the login box that pops up.

CONFIGURE YOUR CONNECTION

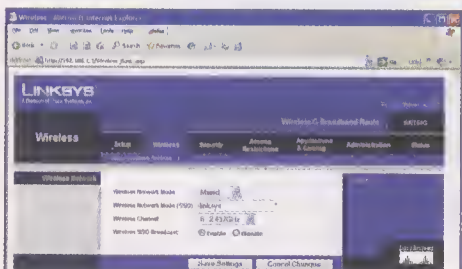


3 Just as you would enter your DSL account information into your PC, you need to tell your router how to reach your ISP. In the router's main setup screen, choose the connection type, such as PPPoE, which is one of the most common connection types, or Automatic Configuration, which is common with cable Internet connections.

If your Internet provider uses automatic configuration, or DHCP, your work is done here. Move on to step 4. If you use PPPoE, you need to enter the username and password given to you by your ISP.

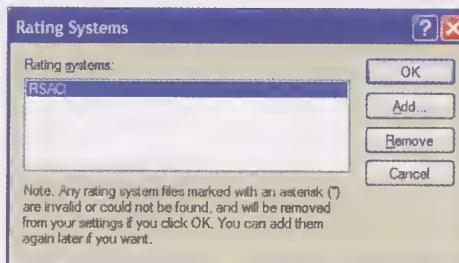
SET UP THE NETWORK

4 Setup menus vary slightly from one router to another, so you'll want to consult the manual for your router to see which menu is where. Some routers put network setup and internet connection settings under the same menu. Others, such as our Linksys, put them under separate, clearly marked tabs. In the Wireless menu, you'll select a network mode. Unless you have a lot of different computers connecting to your network, you can probably set this to 802.11g-only. But if you have older machines, or PDAs, that use 802.11b, you'll want to use mixed mode.



PROTECT YOURSELF

5 The easiest type of wireless security is WPA, or Wi-Fi Protected Access. With this method, all you have to do is give your network an easy-to-remember password, and the router takes care of the rest. In our Linksys router, this is listed as a submenu marked Wireless Security under the Wireless tab, rather than under the Security tab, which would be more sensible. Choose WPA Pre-shared Key and select the TKIP algorithm. Then just type a password into the field for your pre-shared key and save.



Secure Your Connection

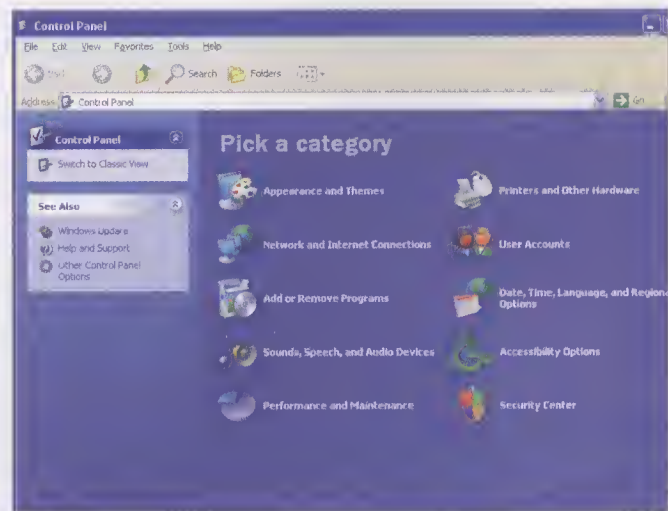
Unless you like to live dangerously, securing your Windows XP is an essential part of getting the most from the Internet. After all, the convenience of online banking quickly evaporates when someone steals your account information and robs you blind. But you needn't be too worried about this sort of worst-case scenario if you take a few simple steps toward locking down your PC before you go online.

Important: The average new computer falls prey to intrusion within 15 minutes of first logging onto the Internet. So it's critical that you turn on your firewall and install antivirus software before you go online. Fortunately, Windows XP Service Pack 2 added improved firewall features to your computer. But you absolutely must buy third-party virus protection if you truly want security.

TURN IT ON

1 Most new PCs come with the Windows Firewall enabled, so you have a minimal amount of protection turned on from the beginning. But so far, Windows XP does not include virus protection, so you'll need to buy and install an antiviral program from a company such as Symantec or McAfee. To check your security settings, click the Security Center icon in the Windows XP Control Panel. It's the one that looks like a shield.

The Windows Security Center displays the security status of your firewall, Windows updates, and virus protection. Ideally, each listing should display a green light and the word "On," indicating that three critical security components are enabled. If you have a red light and the word "Off," you are not protected. You can adjust the properties of each component by clicking the corresponding icon below.



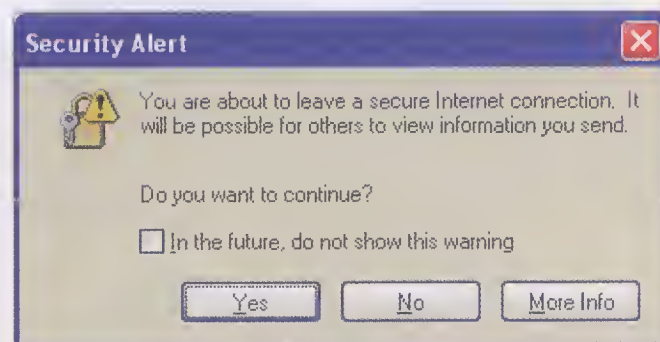
■ That little shield in the bottom-right corner is your first step to locking down your PC.

MANAGE YOUR SETTINGS

2 You can adjust your settings for Internet options, automatic updates, and Windows Firewall from within the Windows Security Center. To control your antivirus settings, you will need to use the utilities that came with your antivirus software, and those will vary from program to program.

The Internet Options icon opens the Security tab of Internet Explorer's Internet Properties menu. Here you can change the way Explorer handles content from various websites in four zones: internet, local intranet (computers connected to yours within your home or office), trusted sites (reliable websites that you visit frequently), and restricted sites (sites you don't trust). Each of the three zones has a default level of security, and you can modify the level by raising the control bar up and down. The higher the bar, the greater the protection.

Bear in mind that more protection also means more hassle. The more restrictive you are with your security settings, the more you will see various warning messages pop up as you surf the web. As a rule, it's better to increase your security level as high as possible, adding sites you visit frequently to your trusted sites list. This will keep you safe while reducing the number of annoying security alerts on the sites you visit most.



■ Tired of seeing these annoying alerts? Just click the box marked, "In the future, do not show this warning."

CONTINUED ON PAGE 74

Secure Your Connection CONTINUED

GET UPDATES

3 Microsoft is constantly updating Windows XP. These updates help improve the way Windows works, but they also fix vulnerabilities that could make your PC a target for attack. Many people look at this as a failure of Microsoft to produce a stable operating system, but that's hardly fair. The fact is, all credible software companies produce product updates, and there's no such thing as perfect software. Since Windows XP drives more computers worldwide than any other operating system, it's no surprise that hackers spend more energy seeking out its weaknesses. As new flaws are discovered, the company releases new updates.

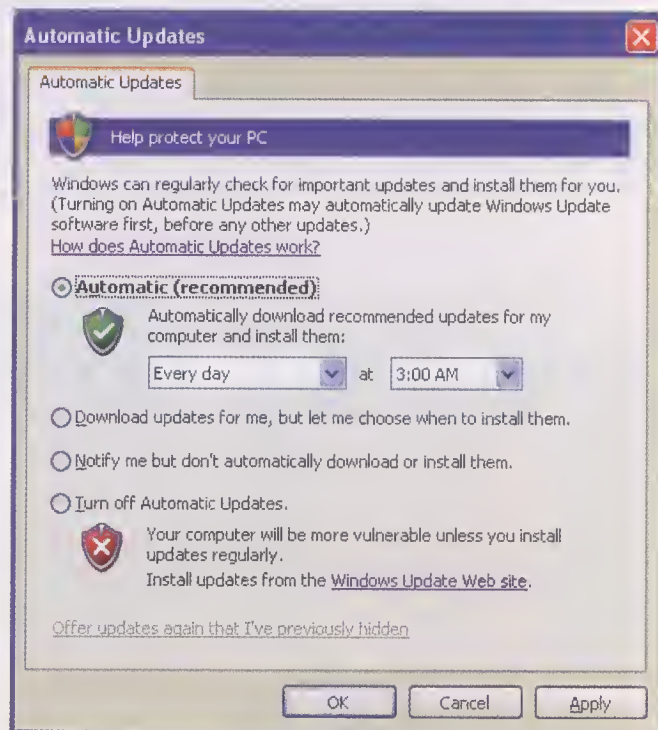
To make sure you're getting the latest updates every day, enable daily automatic updates by clicking the Automatic Updates icon and selecting "Every day" from the drop-down menu under Automatic. It doesn't really matter what time you choose, because XP will simply check for updates the next time you log on if you forget to leave your PC running.

THE GREAT WALL

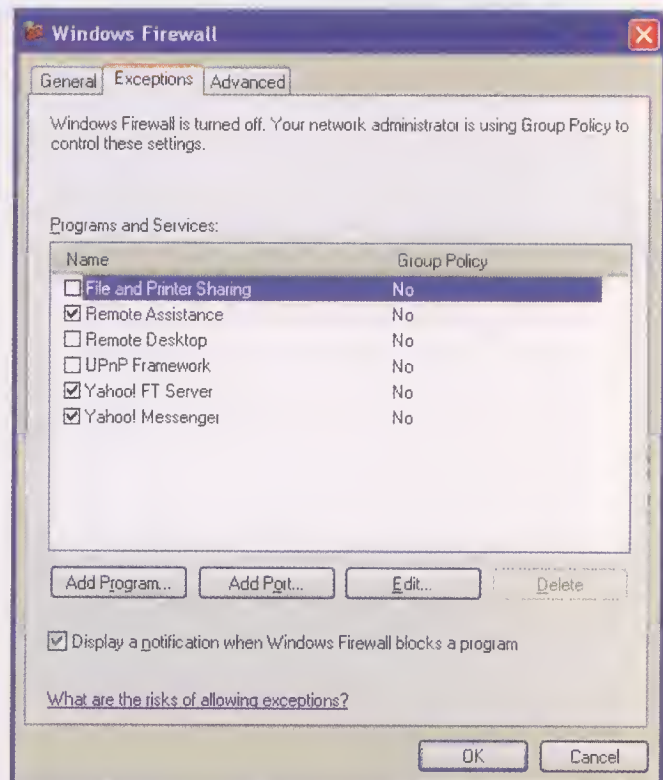
3 A firewall is your first line of defense against intruders, so it's important to keep yours up and running. Click Windows Firewall in your Security Center to make sure you're protected. For most users, the main Windows Firewall window is all that's needed. In it, there are two settings: on and off. Unless you're running some other firewall program, such as *Norton Internet Security Suite 2005*, you'll want Windows Firewall turned on and you'll want to check the box labeled "Don't allow exceptions."

Advanced users who have want to give more freedom to specific programs, such as *iTunes* or *Windows Messenger*, can do so by unchecking "Don't allow exceptions" and clicking on the Exceptions tab. Here you can put a check mark next to the programs you want to unleash. If you do decide to allow exceptions, be warned: Some programs, such as file-sharing apps like *Kazaa* and *LimeWire*, can leave your computer wide open to attackers, and giving them exceptions from your firewall can be a bad idea.

A firewall is your first line of defense against intruders, so it's important to keep yours up and running.



■ Microsoft makes regular Windows XP updates available online. Don't miss out on them.

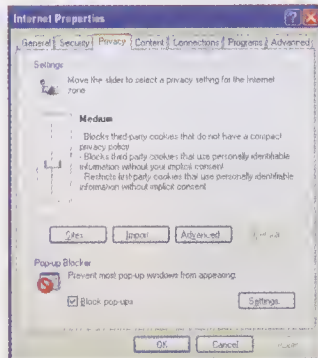


■ Check the Windows Firewall and only allow it the programs you know need access.

Protect Your Privacy

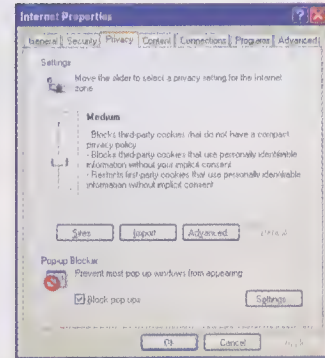
1) LAUNCH INTERNET PROPERTIES

In the name of convenience, Internet Explorer keeps an ongoing log of everything you do on the Internet. To avoid these problems, launch your Internet Properties window and click the Privacy tab. The control bar is a handy way to make a quick adjustment to your security settings. At medium, it prevents sites from putting files on your computer, known as cookies, that track your personal information without your knowledge.



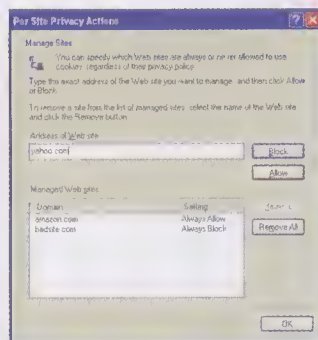
3) BLOCK POP-UPS

Pop-ups are those annoying advertisements that open as new windows, either in front of the window you're browsing in or behind it. Fortunately, Windows XP Service Pack 2 includes a pop-up blocker in Internet Explorer. To enable yours, make sure the box labeled "Block pop-ups" is checked.



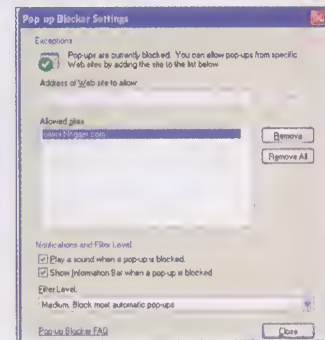
2) MAKE ALLOWANCES

Some sites you visit frequently will require you to keep cookies on your PC, so you'll want to always allow them to do so. Others you'll want to block completely. You can add specific sites to your allowed/blocked lists by clicking the Sites button.



4) TUNE YOUR POP-UPS

You can fine-tune the settings by clicking the Settings button, which opens a window where you can enter websites you'd like to allow pop-ups on, such as webmail sites. You can also choose to play a sound whenever a pop-up is blocked, but that can be annoying as the pop-ups themselves. Finally, there's a drop-down menu here that lets you choose the level of blocking you'd like to use. Medium is fine for most users.



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HOW TO CREATE YOUR OWN DEDICATED GAMING SERVER

Don't settle for being the life of the party — *be* the party by hosting multiplayer action on your own dedicated game server! We'll get you going in just 12 steps.

WHAT YOU'LL NEED

- **A SPARE PC** | In general, if you've got a CPU and memory above the game's minimum spec, you should be okay. Don't worry about videocard muscle — the server doesn't need it.
- **A ROUTER** | You may have received one when you signed up for broadband service, but consider upgrading to a "gaming router," such as D-Link's GamerLounge series (from \$120, www.dlink.com), that can prioritize gaming traffic on your network.
- **A DECENT BROADBAND CONNECTION** | The faster your connection, the more players you'll be able to support (up to the capabilities of your server, of course).
- **A COPY OF THE GAME YOU'RE HOSTING** | You probably figured this one out on your own.
- **A SERVER VERSION OF THE GAME** | If dedicated server software wasn't bundled with your game, you can usually download it for free from the publisher's or developer's website.
- **A COMPETENT OPERATING SYSTEM** | By "competent" we mean "not Windows 9x" and its pitiful networking. Use Windows 2000 or Win XP instead.

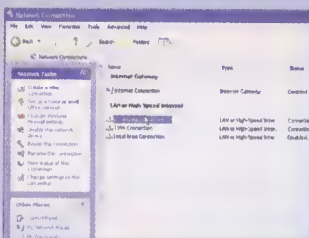


1 | GET A FAT PIPE

Again, the faster your connection to the Internet, the smoother the gaming experience you and your remote players will enjoy. If you just signed up for broadband or upgraded your bandwidth, make sure to confirm that you're receiving the full amount of bandwidth you're paying for by going to a bandwidth-testing site, such as www.bandwidthplace.com/speedtest/.

2 | ASSESS YOUR ADDRESS

Install your router as described in the router's manual (includ-

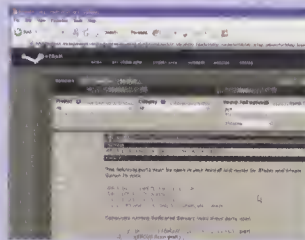


Network Connections will immediately let you know when your new connection is ready for action.

ing the software), and Windows should automatically establish a connection to the Internet. If you don't already know what your fixed IP address is, go to Start > Run and type cmd. Type ipconfig /all, and write down the IP Address, Subnet Mask, Default Gateway, and DNS Server numbers. Then go to Control Panel > Network Connections, right-click on the icon for your network connection, and choose Properties.

3 | BY THE NUMBERS

Double-click on the TCP/IP entry in the list. If your PC connected straight away, both options on this Properties page will be set to "Obtain Automatically." If they aren't, you'll have to manually enter the numbers you got from ipconfig. Click OK. Make sure you can still access the web — if you can, then you've fixed your IP address and can move on. If not, contact your broadband provider and ask them what DNS settings you need to use.



Self-Servers: Ports allow incoming connections to (and outgoing connections from) your PC, and different multiplayer games use different ports.

4 | SORT YOUR PORTS

You now have a PC with a fixed IP address to host games on. The next trick is getting your router to route all game-based requests to your dedicated server instead of delivering them to Grandma's Rec-PC in the kitchen. This is called port forwarding, and it's done on a game-by-game basis

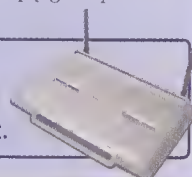
(as different games use different ports). These should be listed in the game's ReadMe file or on the publisher's or developer's website.

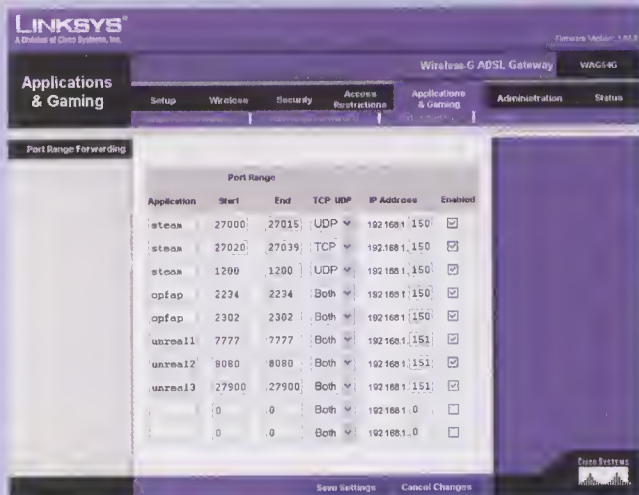
For example, a Steam dedicated server uses UDP 1200, 27000-27015 and 27020, along with TCP 27020-27039 and 27015. Don't panic. UDP and TCP are just transmission protocols (like FTP and HTTP). Once you get into your router's configuration utility, it will be fairly obvious where these enigmatic numbers belong.

5 | ROUTER REDUX

Routers are configured through your web browser; your router's manual will give you the IP address you need to access it (it's usually 192.168.1.1). Find the port-forwarding section of the administration utility (again, your rout-

Routers are configured through your browser; your router's manual will give you the IP address you need to access it.





■ **Port Authority:** Once you've located your router's port-forwarding page, the rest is a snap — simply plug in the numbers as indicated in your game's documentation.

er's manual will tell you where to find it if it's not apparent). Here, you'll need to manually input each range (if you're entering just a single port number instead of a range, set Start and End to that same port number), set it to UDP or TCP as instructed by your dedicated server software, and specify the IP address established in Step 3. If you're having trouble with this step, go to www.portforward.com, where you'll find an obsessively compiled list of instructions for configuring most routers and most games.

| 6 | GAME TIME

Now that you've got a series of port-forwarding entries tailored for the game you want to play, you can install the dedicated-server version of your game onto your dedicated-server PC. Some games have this as an option in the main menu; others have a downloadable executable you run from Windows. Check the game's documentation or website if you can't find it.

| 7 | YOU'VE BEEN SERVED



■ **Free with XP:** Don't forget that PCs running XP Service Pack 2 have a built-in firewall that's turned on by default.

Your game's manual or official website may offer specific advice for setting up dedicated servers, but you can start by simply naming your server and protecting it with a password so you don't get random gimps blundering in while you're getting organized. Once you're ready, start the server: in most cases you'll be dumped back to the desktop with a tray icon to show the server is running, plus a window to view the settings.

| 8 | ACCESS CONTROL

When you launch the server software, your firewall should open a dialog box asking if you want to let the server accept connections. Set it to allow them.

| 9 | HOOKING UP

Once your server PC is ready for use, head back to your gaming PC and go to www.whatismyip.com to see what your LAN's external IP address is. You'll need to give out this address to the other players. Check that it's working by firing up the client version of your game and entering the IP as a multiplayer server. You should see your server listed with a super-low ping because, well, it's right over yonder.

| 10 | TEST RUN

Draft a friend to fire up his copy of the game and confirm that he can detect your server and connect to it. If he can't, go back into the router admin utility and enter the IP address of the server PC in the DMZ ("demilitarized



■ **Yellow Alert!** Zone Alarm is alerting us to software that's trying to connect to the Internet. Because we recognize this software as Steam, we'll allow it to do so.

zone") section, which has no port protection. This will forward every port to the server, which is horrible for security but good for troubleshooting. If your friend can suddenly connect, you bungled the port forwarding. Retreat to step 5 and double-check your entries, and don't forget to remove your IP address from the DMZ when you've successfully forwarded your ports.

| 11 | TEST RUN, PHASE 2

If the DMZ gambit doesn't work, try disabling all your software firewalls and any firewall pro-

tection built into your router. If your friendly beta-tester is suddenly able to connect, turn the firewalls back on one by one until you find the offender, and then take another swing at configuring it. If you've opened your PC to the world and people still can't connect, your broadband provider may be blocking the ports you need (they do this to cut down on bandwidth-hogging traffic from file-sharing applications and the like); hassle your ISP's technical support to find out if the provider is blocking ports.



| 12 | SHAKEDOWN

Finally, ensure nothing is sapping your precious bandwidth. Anything that suddenly decides to jump online — P2P apps, software auto-updaters, and virus scanners — can screw things up, so terminate all non-gaming programs and any other PCs using your connection. Trial-and-error will reveal how many people you can support, and the official website and forums will introduce the various console commands to configure things on the fly. Have fun, and don't stay up too late.

10 Ways to Whip Windows XP Into Shape

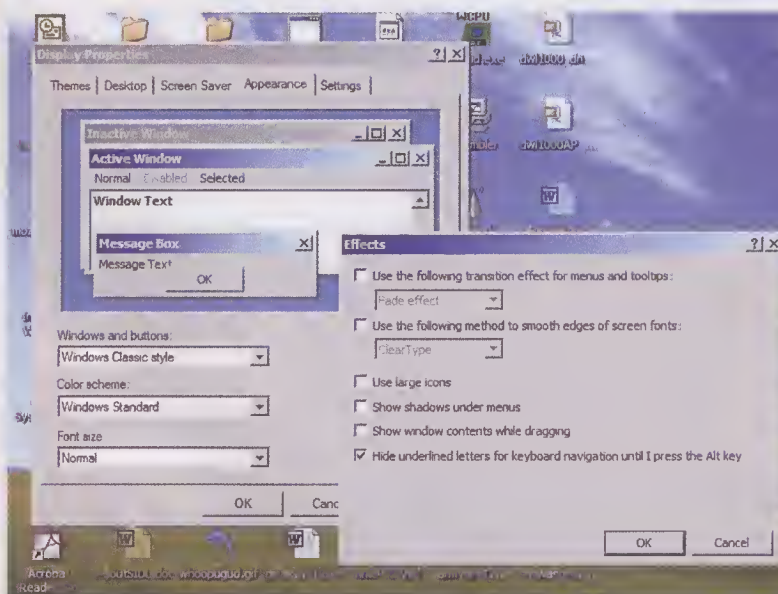
Learn how to give your system a performance boost right now

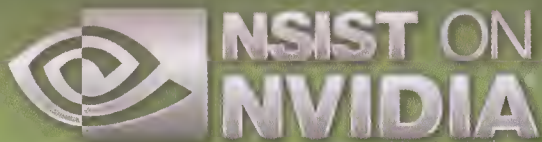
So you've just completely pimped out your desktop, and now your PC is running slow as molasses? We told you not to assemble it with sticky fingers. Whatever the case, if speed is what you're looking for, you found the right section of this magazine. We'll show you how to trim your desktop down to the bare necessities and accelerate your interface.

1 Speed Up Your Interface

We think WinXP's interface is great, but we also run the latest hardware, so our machines easily fulfill the operating system's performance requirements. If the new Luna UI has got your older machine chugging along at 486 speeds, there are a few things you can do to pick up the pace.

First, go to the Display Properties Control Panel (right-click an empty spot on your Desktop and choose Properties). Now choose the Appearance tab and click the Effects button. Uncheck the following: "Use the following transition effect for menus and tooltips," "Use the following method to smooth edges of screen fonts," "Show shadows under menus," and "Show window contents while dragging." If this doesn't speed up your OS enough, you can turn off the next-gen interface altogether by selecting "Windows Classic Style" from the Windows and Buttons menu on the Appearance tab. In our Lab, this has given us 5 to 10 percent faster performance, as measured through our benchmark tests.



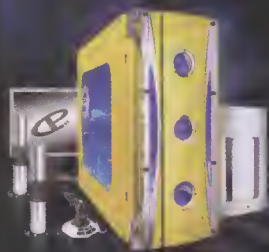


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2 See Your Icons Faster

Every time you open My Computer to browse folders, XP automatically searches for network files and printers, which can be causing a delay in how quickly your icons are displayed. Here's how to see them faster:

1. Open My Computer.
2. Click on the Tools menu and select Folder Options.
3. Select the View tab.
4. Uncheck the very first box that reads "Automatically search for network folders and printers."
5. Click "Apply" or "OK."

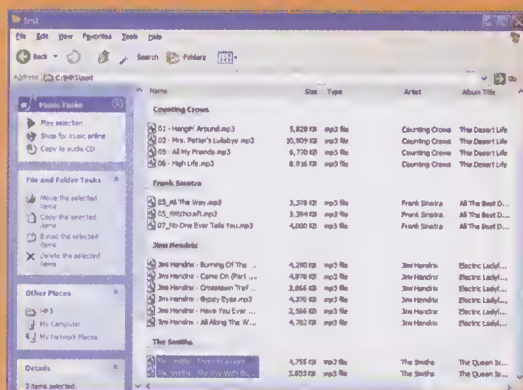
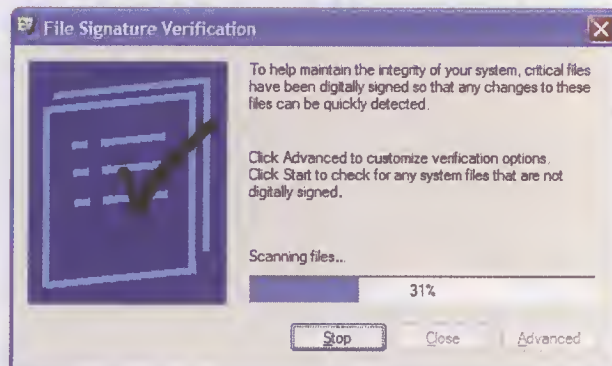
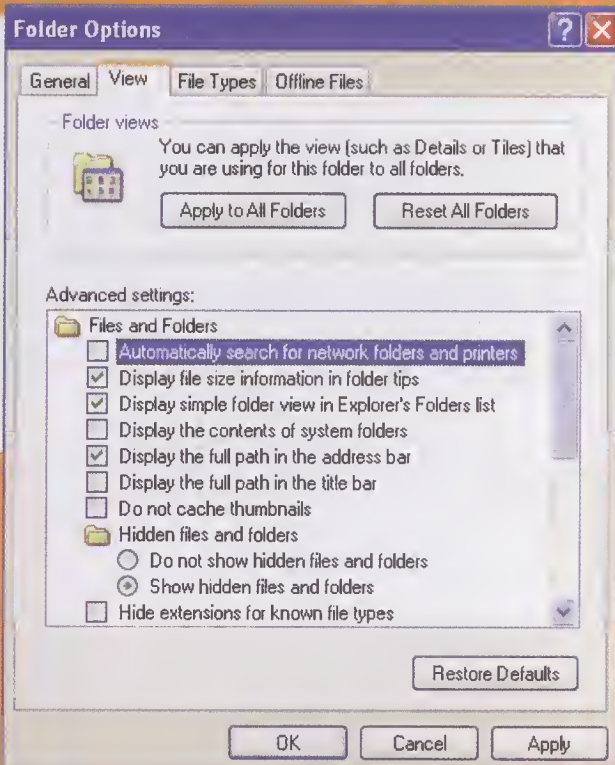
3 Turn Off Indexing

Windows XP keeps a record of all files on the hard disk so that it can locate a particular file more quickly when you perform a search. The downside to this is that—since the computer has to index all of your files—it slows down normal file commands like open, close, etc. If you don't use the search feature much, turn indexing off: Control Panel>Administrative Tools>Services>Disable Indexing Services.

4 Check for Signed Drivers

If it were up to the programming wizards at Microsoft, the entire world would run signed drivers. This is understandable—a significant number of crashes and system errors can be traced back to broken drivers. Signed drivers have passed through the Microsoft Hardware Qualification Labs and should be more reliable and robust than unsigned ones.

If your machine is crashing, and Windows is blaming it on a problem driver, go to the Run program under your Start menu, and run sigverif.exe to scan your system for unsigned drivers and other system files. Now visit your hardware manufacturers' web sites to find more up-to-date and signed versions of those drivers. Remember: Signed drivers are better, but unsigned drivers aren't necessarily bad, especially those that are updated frequently, like videocard drivers.



5 Organize Your File View

If you have a big folder full of images from your digital camera or scores of unsorted MP3s, the "Show in Groups" folder option might be useful to you. It allows you to group your files in the Explorer window into similar categories instead of just listing them in the order you specify in the "Arrange by" menu. If you want to use "Show in Groups" to organize shots you took with your digital camera, choose "Arrange by Modified" to sort your snaps based on the day they were shot, then check "Show in groups" to group them by day. It's also convenient for music: Use "Arrange by Artist" with "Show in Groups" to group songs by the same artist together, or "Arrange by Album" to group songs from the same platter.

6 Run Command Line Apps Fast, Fast, Fast

If you frequently run command-line applications, you should know about the Address bar's dirty little secret: Not only does the Taskbar's Address bar give you a quick way to launch your favorite web sites, but you also can run applications by typing the program's name into the Address bar.

Putting the Address bar onto the Taskbar is as easy as right-clicking the Taskbar, going to Toolbars, and selecting Address. You can drag the bar to an empty, convenient place on your Taskbar, where it will live forever.

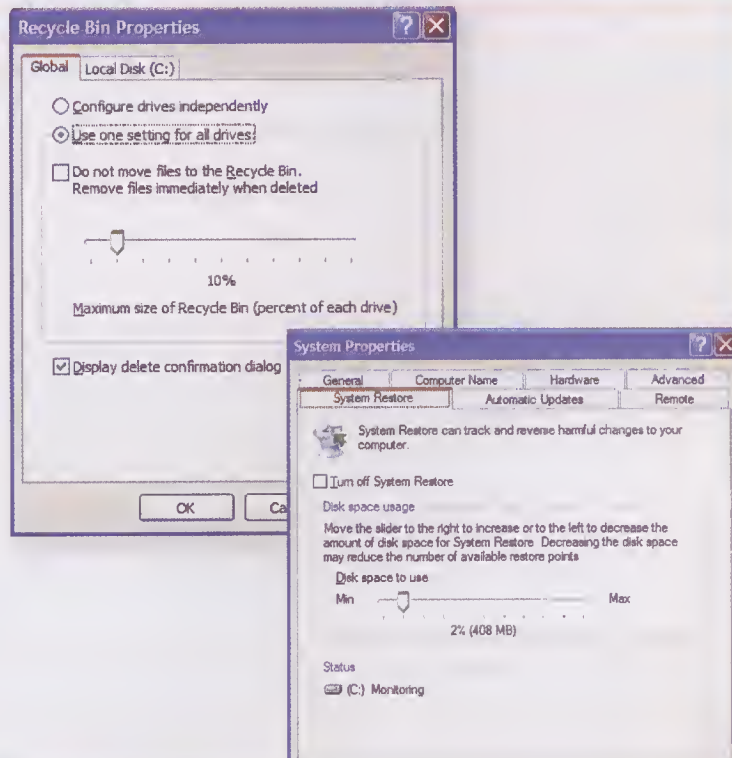
Don't know what to type to open your program? It's easy to find out. Right-click on the shortcut you use to open the program, go to Properties, and look in the Target box. All you need is the app's name, which usually ends with .exe, .com, or possibly .bat.

7 Optimize System Restore and the Recycle Bin

We really dig System Restore. If you install a driver that hoses your system, System Restore will frequently let you roll your system back to a time before that evil driver arrived. However, System Restore will eat 2 percent of your disk by default. That's not a big deal if you've got a puny 80GB hard drive, but if you just shelled out for a 500GB monster, 2 percent of that drive is 10GB.

To save your drive, open up System Properties again, go to the System Restore tab, and move the slider until you're a little happier with System Restore's disk space usage.

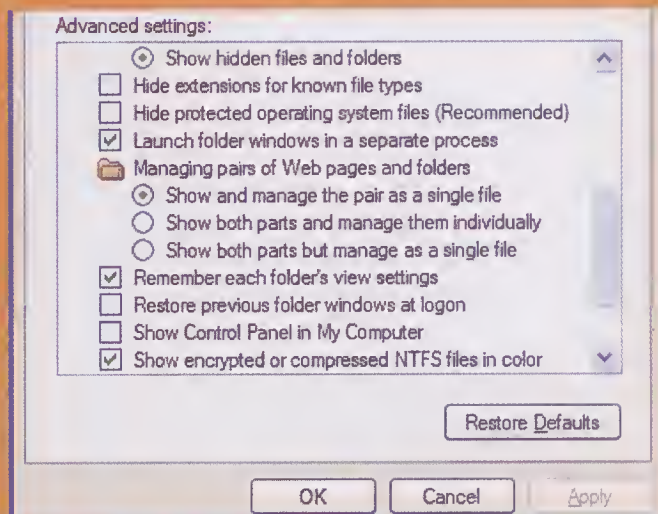
If you thought System Restore was a disk hog, the Recycle Bin consumes even more disk space—it occupies 10 percent of your drive by default! That's a full 50GB on our new 500GB drive. To turn down the Recycle Bin's disk usage, right-click the Recycle Bin, go to Properties, and move the slider from 10 percent to something a little more compatible with today's massive disks (we wonder when we're going to see a sub-1 percent option).



8 Don't Let Explorer Crashes Get You Down

If you're sick of a single Windows Explorer window crashing and then bringing down the rest of your OS with it, follow this tip: Open My Computer, go to Tools, then Folder Options. Click on the View tab, then scroll down to "Launch folder windows in a separate process" and enable this option. Just be aware that you'll have to reboot your machine for this tip to take effect.

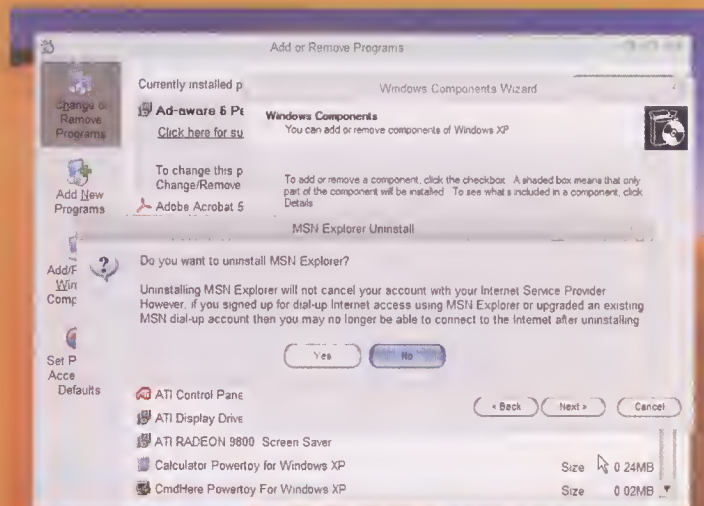
Now, if Explorer does crash on you, taking your Taskbar and Start menu with it, it's easy to get them back. Just press Control + Alt + Delete. Then select File, New Task, and type explorer.exe to start a fresh version of your shell.



9 Delete MSN Explorer

If you're happy with Internet Explorer or another browser, and satisfied with your current e-mail and Internet service provider, you can save more than 13MB of hard drive space by deleting MSN Explorer. Windows Help says MSN Explorer is "software that makes it easy to get more from the web." That may be, but it's just a browser that integrates any Microsoft e-mail and messenger clients that require an MSN or Hotmail account. So if you're using another ISP, drop this duplicate browser like a hot potato. Open Control Panel, launch Add or Remove Programs, and on the left side of the dialog box, click Add/Remove Windows Components. Scroll through the list of Windows components and uncheck MSN Explorer. Read the warning and click Yes if you don't rely on MSN for your Internet connection. Click Next and follow the remaining on-screen prompts.

MSN Explorer is Microsoft's all-in-one Internet software solution. It includes a browser, email client, and messenger client. MSN Explorer requires an established MSN or Hotmail email



account and an available Internet connection. The email client included with the software only supports Hotmail or MSN accounts. The software does not support external third-party email programs. As a result, you may not configure EarthLink email in the MSN Explorer settings.

10 Stop Windows from Saving the Thumbnail Cache

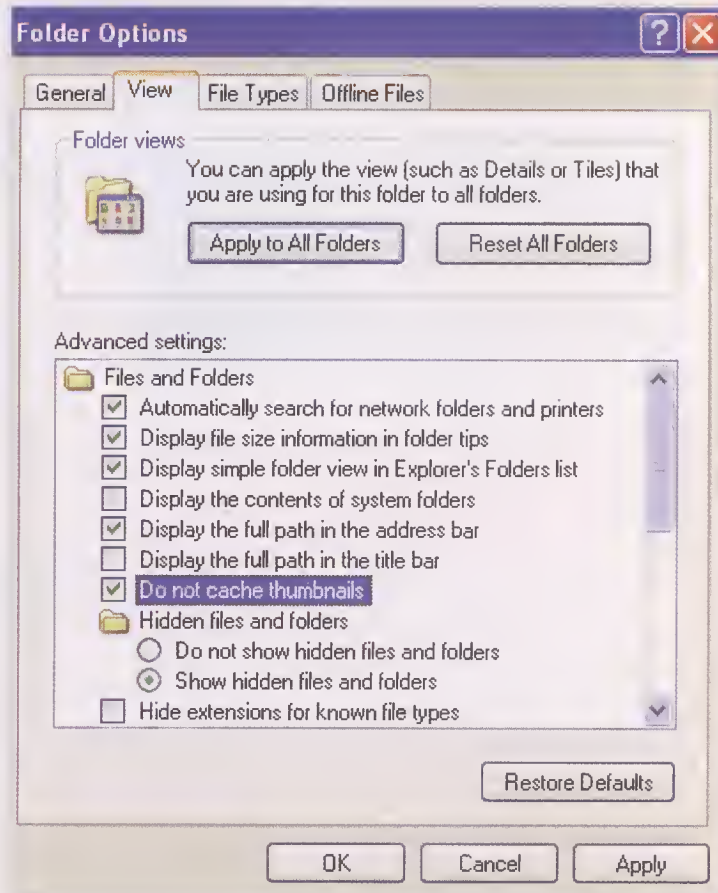
By default, Windows XP shows the thumbnail view of certain folders, whether you want it to or not. Even if you choose Details (or some other view) as your preference by going to Tools > Folder Options > View tab and click Apply to All Folders, Explorer may still revert back to the clumsy thumbnails view. It does this for any folder in which it finds the THUMBS.DB file; naturally, if you delete this file, it won't happen again.

THE PROBLEM IS THAT WINDOWS SEEMS TO RECREATE THE THUMBS.DB FILE AUTOMATICALLY. HERE'S HOW TO PREVENT THIS:

1. In Explorer, go to Tools > Folder Options or open the Folder Options icon in the Control Panel.
2. Choose the View tab, and turn off the "Do not cache thumbnails" option.
3. Click OK.

YOU ALSO CAN CHANGE THIS SETTING IN THE REGISTRY:

1. Open the Registry Editor (Regedit.exe).
2. Navigate to HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced.
3. Double-click the DisableThumbnailCache value, or go to Edit -> New -> DWORD value to create a new value by that name.
4. Enter 1 (that's the number "1") for its value.
5. Click OK and close the Registry Editor when you're done; you'll have to log off and then log back on for this change to take effect.





VIGOR™
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MCS Monsoon Active
Cooling System

Monsoon II

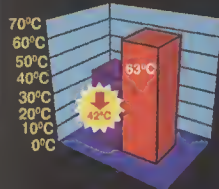
TEC CPU Cooling System

Designed Exclusively for Vigor Gaming by Madcatz Technology



Performance Comparison

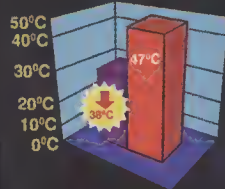
Vigor Monsoon II
Intel Pentium 4 3.6GHz



CPU Loading 100% / Chamber Temperature 25°C

Performance Comparison

Vigor Monsoon II
AMD K6 Athlon 64 x2 Dual Core



CPU Loading 100% / Chamber Temperature 25°C

"... Overall, I was impressed by how well the Monsoon II cooler performed. It was easy to install and produced very good results – actually cooling the fully loaded A64 3200+ processor more than 3°C below the ambient air temperature. The Monsoon II offers better cooling performance than most high-performance HSFs or water-cooling systems that rely on standard convection cooling... All HSFs were tested on the same CPU under the same conditions. Notice that none of these coolers use active cooling and therefore none of them can achieve sub-ambient CPU temperatures the way the Monsoon II can."

~ Lee Garbutt Case, PSU and Cooling System Editor PCPerspective.com

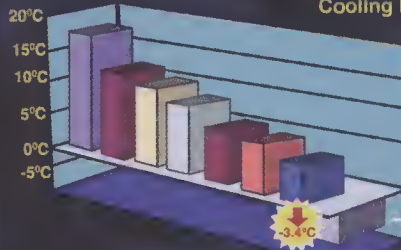
"...you'll find AMD's Athlon 64 X2 4400+ processor boldly overclocked from 2.2GHz to 2.82GHz The Vigor Force Recon AXE's most unusual feature is its cooling scheme. The rig's interior temperature remained consistently cool even while running 3dMark2006 on a loop for hours. Vigor Gaming calls its secret chill sauce-deep breath-the Vigor Monsoon II TEC Active CPU cooling System...."

~ Logan Decker - Senior Editor, PC Gamer Magazine

SPECIFICATIONS:

Socket Type	AMD: 754/939/940/AM2 Intel: LGA 775
Cooler Dimensions (DxWxH)	5.51 x 3.74 x 6.30 in
Thermoelectric Chip	1.57 x 1.57 in / 12V DC
Heat Sink Material	4 heat pipes, Aluminum Fin & Copper Base
Heat Sink Dimensions (DxWxH)	3.54 x 3.54 x 6.30 in
Fan Speed	Low-2000 rpm to High-2600 rpm ± 10 %
Noise Level	24 dB(A) ~ 34 dB(A) ± 10 %
Thermal Resistance	0.13(°C/W)
Control Interface System	5.25" Management Unit w/LCD Display
Temperature Monitor Range	0°C-99°C/32°F-210.2°F

Cooling Performance Comparison



Source: PC Perspective, July 30, 2006, Vigor Monsoon II Active TEC CPU System Review

For comparison only. All HSFs for the KB platform and the stock OEM aluminum cooler that comes bundled with the Athlon 64 3200+. All HSFs were tested on the same CPU under the same conditions.

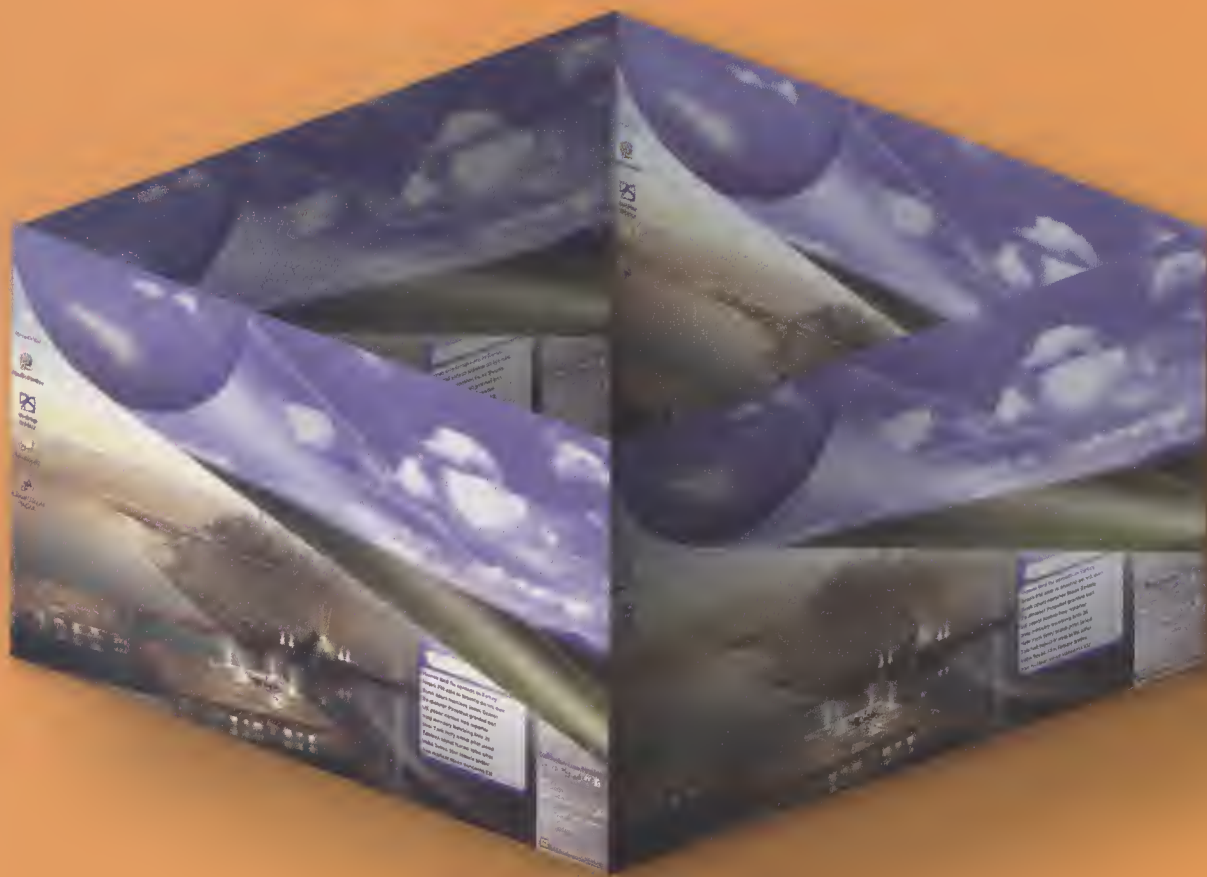
Thermalright Ultra-120 with 120mm Delta SHE Fan
Thermalright Ultra-90 with 92mm Yantec Tornado
Thermalright XP-120 with 120mm Delta SHE Fan
Arctic Cooling Freezer 64 Pro with stock fan at 12V

Cooler Master Hyper 6 with 80mm CM Vantec Tornado
Zalman CNP7000A-CU with integrated Zalman variable speed fan at High Speed
Athlon 64 3200+ OEM aluminum heatsink with 70mm fan

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How to Modernize Windows XP

Who says you can't teach an old dog new tricks? Whip this aging OS into fighting shape with our expert advice

The first time we used Windows XP, it seemed like the OS of our dreams. After all, XP combined the stability of Windows NT with the gaming chops of Windows 9x, and even threw in a colorful new interface as a bonus. What more could we ask for?

A lot, it turns out. In the more than four years, the proliferation of viruses, worms, and spyware has exposed the operating system's intrinsic weaknesses. Meanwhile, continued innovation from Apple has pushed OS X to the forefront in terms of features, flashiness, and usability. Mac users can now boast of their OS's slick UI, instant search, and superior multimedia

capabilities.

Luckily, hope is on the horizon. The next version of Windows—Vista—is expected to close the gap on all of these fronts when it's released early next year. But what about those of us who don't want to wait that long for a modern OS? You already know how to secure Windows with antivirus, anti-spyware, and firewall software, but how about bringing it up to date feature-wise? Good news: With a little help from some nifty low- and no-cost utilities, bringing Windows XP up to snuff is as easy as pie. We'll show you how to get the OS goodness you crave without waiting for Vista, or selling your children into servitude to buy a pricey Mac.

Functionality

Five years ago, hard drives were in the 40GB range, many people still used 56K dialup, and only gamers had 3D accelerators. Windows XP was built for those times, but today's world demands an OS that recognizes the promise of faster Internet connections and meets the challenges of locating information on a jam-packed 400GB hard drive. Here are some utilities that can add the functionality you need to Windows XP.

DESKTOP SEARCH

Would you rather be stuck on a desert island with no food, water, and clothing, or trying to locate a file on your computer using Windows' built-in search utility? That's a tough call, considering that you could very well die of old age before Windows finds the file you're looking for.

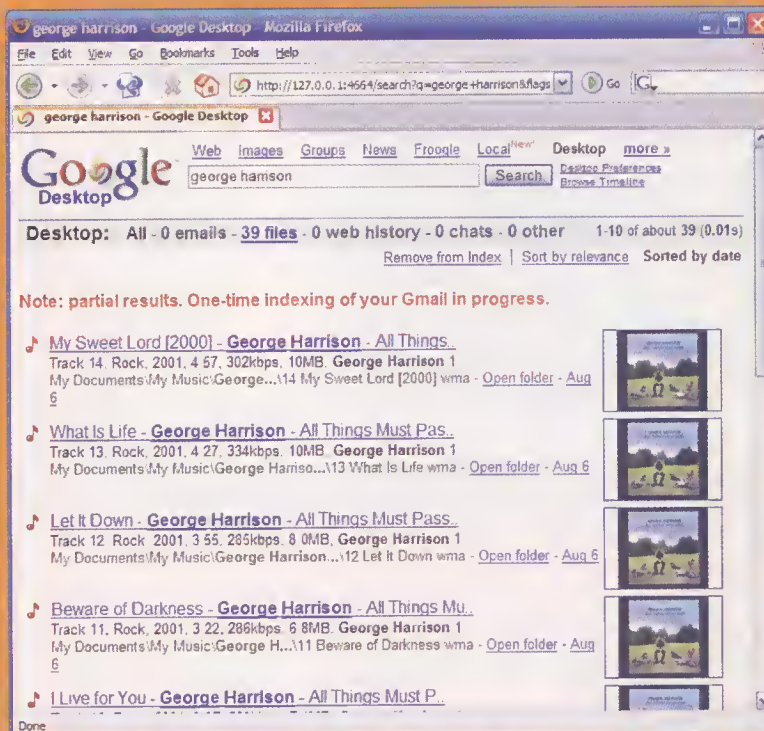
Luckily, thanks to the advent of external desktop search apps, you may never need to use the Windows search utility ever again. Desktop search programs constantly run in the background, indexing the contents of files on your hard drive as they are created or modified. This facilitates near-instant searches of your computer—you can find and display all the documents on your computer that contain the phrase "Enrique Iglesias" just as quickly as you could perform the same search on Google. There's no need to worry about sapping your computer's performance either, because most desktop search tools only add to their index while your system is idle.

Until Vista delivers integrated desktop search, Windows XP users have a plethora of free third-party search tools to choose from. Our top choices are *Google Desktop* and Microsoft's *Windows Desktop Search*. Both members of this dynamic duo beat the hell out of old-school search technology, but each one also has its quirks.

Windows Desktop Search (<http://toolbar.msn.com>) is bundled with the MSN Search toolbar, which can easily be disabled if you don't want to use it. (The toolbar adds rudimentary tabbed-browsing to *Internet Explorer*, and also supports a phishing-protection plugin.) When you run a search, *Windows Desktop Search* displays a substantial preview of each file matching your search query, as opposed to the brief summary shown by *Google Desktop*. Our main complaint with *Windows Desktop Search* is that it can't search PDF files out of the box. Microsoft makes you download a separate plugin for that—not the end of the world, but an unnecessary hassle to be sure.

Meanwhile, *Google Desktop* (<http://desktop.google.com>) bundles a groovy sidebar application that lets you download and use all sorts of useful applets on your desktop. As with *Windows Desktop Search*, you can download plugins that expand the capabilities of *Google Desktop*. You can search many popular file types (including PDFs) by default, and *Google Desktop* will even index your Gmail account. However, while Google's search program is a bit more user-friendly than Microsoft's, it's also marginally less customizable, with fewer options exposed to the user. There are tons of third-party plugins for *Google Desktop*, however, that let you add search to almost every common file type.

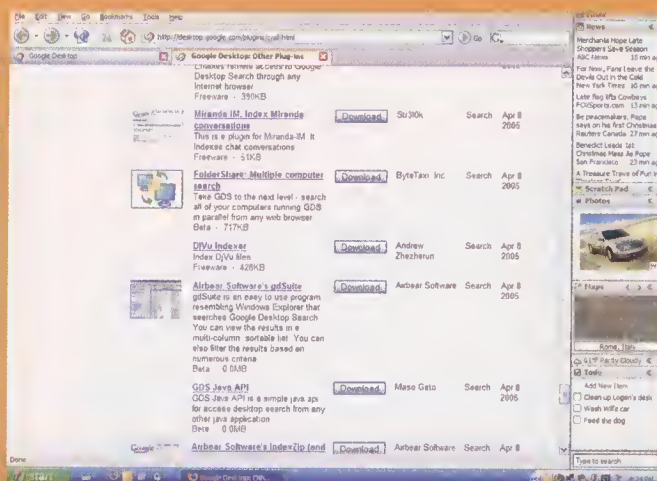
We recommend you try out both search utilities, then pick the one you like best and uninstall the other. While you can run them both at the same time, we don't recommend it, as the indexing utilities will take a long time to create their respective indices if they both run at the same time.



The search interface for *Google Desktop* will be immediately familiar to anyone who uses Google's Internet search engine.



Windows Desktop Search will find your files in a split second and display a preview or other contextual data, such as album information for music.



Google also bundles a sidebar with its desktop search application. It ain't original, but it gets the job done.

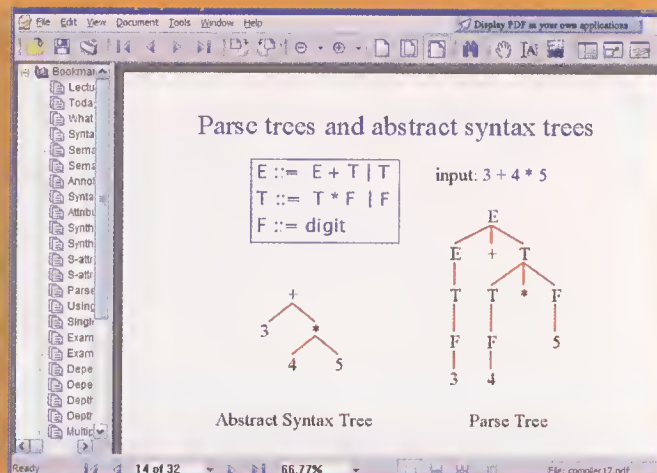
SIDEBARS

Of all the new features set to debut in Windows Vista, we think the on-again, off-again sidebar is one of the coolest. (For a while, the sidebar fell off of the Vista features list, but it seems to be back, at least for the time being.) For the uninitiated, the sidebar is exactly what it sounds like: a long bar down the side of your screen that can display all sorts of fun and useful information, such as weather forecasts (useful), RSS news feeds (also useful), and photos of your hamster (fun). This is similar to the concept of widgets; the sidebar simply provides a convenient and prominently visible place to display useful or entertaining info.

And guess what? You don't have to wait for Vista to get in on the hot sidebar action. Since Microsoft first demoed the concept several years ago, numerous free third-party sidebar applications have been created. Our top pick is *Desktop Sidebar* (www.desktopsidebar.com), which is fast, stable, and boasts a solid library of skins and plugins. Some of our favorites include the ABC BitTorrent Panel, which lets you monitor your BitTorrent downloads; the DSiTunesController plugin, which allows you to control iTunes even if it's minimized; and the Calendar Panel, which displays your upcoming appointments from Outlook. All of these plugins and more are either included with *Desktop Sidebar* or freely downloadable from the program's website.

Of course, if you're already using *Google Desktop Search* on your computer, you might simply want to use the sidebar that's included with it. Google's sidebar comes stocked with a bevy of plugins, many

Monitor stock prices, check the weather, and keep up on the news—all from the side of your computer screen with *Desktop Sidebar*.



Foxit Reader is a fast, streamlined alternative for viewing PDF files.

of which are related to Google services. For example, the default installation includes a newsfeed from Google News, a rotating display of maps from Google Maps, and a Gmail plugin. You also get conveniences such as a to-do list and a web/desktop search box. Dozens of additional plugins are available online (<http://desktop.google.com/plugins>); most of them offer functionality similar to the plugins available for *Desktop Sidebar*.

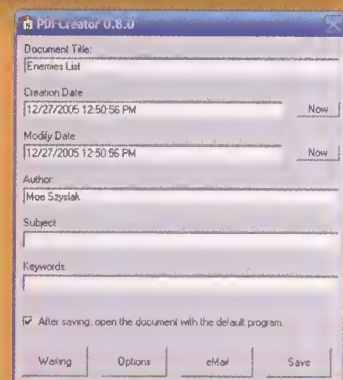
PDF TECHNOLOGY

If you've used a Mac recently, you may already know that newer versions of OS X offer built-in support for Adobe's ubiquitous PDF file format—any app that can print can create PDFs. Meanwhile, Windows users are stuck viewing PDFs in the slow and bloated *Adobe Reader* application, and have no easy way to produce their own PDF files. Right?

Wrong! Denizens of Windowsland do in fact have recourse from Adobe's PDF monopoly. For viewing PDFs, we recommend ditching *Adobe Reader* for the lean and mean *Foxit Reader* (www.foxitsoftware.com). This program is the most polished and complete alternative PDF viewer we've seen here at *PC Gamer*. It's free, requires no installer, and leaves a footprint of less than 3MB on your hard drive. Best of all, it supports all the most important features of *Adobe Reader*, yet boasts a startup time that's measured in seconds instead of weeks (yes, Adobe, that's a dig).

What about those of us who need to produce our own PDFs? You could shell out the big bucks for a professional PDF-creation program—or you could just download the free, easy to use *PDFCreator* (www.sourceforge.net/projects/pdfcreator). This simple open-source tool installs as a printer driver in Windows. That means you specify output settings (resolution, paper size, etc.) through Windows XP's Printers and Faxes utility. Conveniently, it also means you can produce PDF files from any Windows program that's capable of printing.

When you want to export a document to PDF from a program, just use the usual Print command and select "PDFCreator" as your printer. A dialog box will pop up asking you to specify a filename and optional information such as an author and subject. Simply enter the requisite information, click Save, and choose a location for the file. That's all—it's really that easy!



With the free open-source *PDFCreator* tool, you can create your own PDFs from any program that supports printing.

WEB BROWSER AND EMAIL CLIENT

By now, every power user knows that *Internet Explorer 6* is far behind the curve in terms of features and security. Microsoft knows that too, and is busy working on a new version of *IE* that will add key enhancements like tabbed browsing and improved security. We'll reserve judgment on *IE7* until the final version is in our hands, but until then, there's no reason to recommend using *IE6* when two outstanding alternative browsers are available free of charge to Windows users.

Our favorite alternative web browser is *Firefox* (www.mozilla.com). The core program offers niceties like tabbed browsing, a download manager, and RSS support. In conjunction with the vast library of extensions available on the Internet, *Firefox* becomes incredibly powerful and almost infinitely customizable. *Firefox* isn't perfect—it occasionally displays a web page incorrectly, and it has a knack for letting misbehaving plugins consume undue amounts of memory—but for the time being, it's almost universally accepted as the best web browser. Grab it today, and check out some extensions on the Mozilla website or at the Extension Room (<http://extension-room.mozdev.org>).

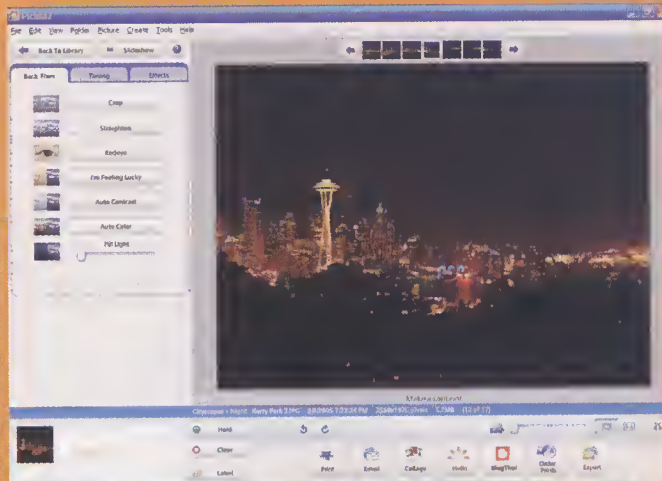
The *Opera* browser (www.opera.com) has also garnered quite a bit of attention since it became a free product. It's a solid browser with a fiercely loyal fan base, and has some interesting features—built-in mouse-gesture support, anti-spyware features, and even voice navigation—that might be worth a try. The interface, however, is not as immediately intuitive as *Firefox*'s, and we encountered problems rendering some web pages.

Though it doesn't get as much attention as *Internet Explorer*, the *Outlook Express* email client that comes with Windows is equally dated. If you've already bought a more powerful client such as Microsoft's *Outlook 2003*, you have no need for concern. But if you don't need or can't afford a high-end email client, you might want to consider Mozilla's free *Thunderbird* client (www.mozilla.com/thunderbird). It offers all sorts of features not found in *Outlook Express*, from message encryption to a spam filter. And like *Firefox*, *Thunderbird* supports extensions, allowing you to customize and expand its capabilities to your heart's content.

MULTIMEDIA APPS

Multimedia is something at which Apple has always excelled. Its suite of *iLife* apps gives users an easy way to edit and organize photos, make home movies, burn DVDs, and more. Fortunately, you can get most of these capabilities for free on Windows.

Google's *Picasa* software (<http://picasa.google.com>) is great for organizing your photos and making simple touch-ups. Its intuitive interface offers a simple way to sort through your photo library and create your own slide shows. *Picasa* also gives you the power to easily make essential photo edits, such as cropping, color saturation, straightening, and red-eye removal. For the casual photographer, it's



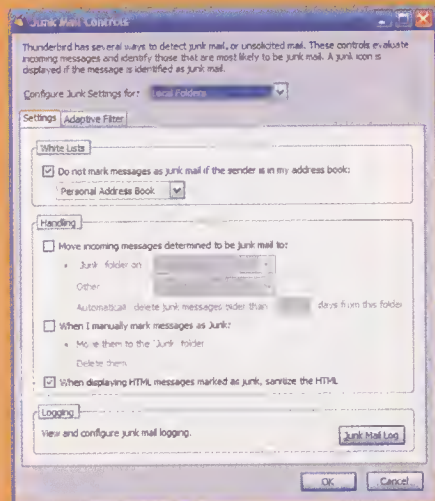
Organize your photos and make essential edits with Google's free *Picasa* picture-management software.

a must-have piece of software.

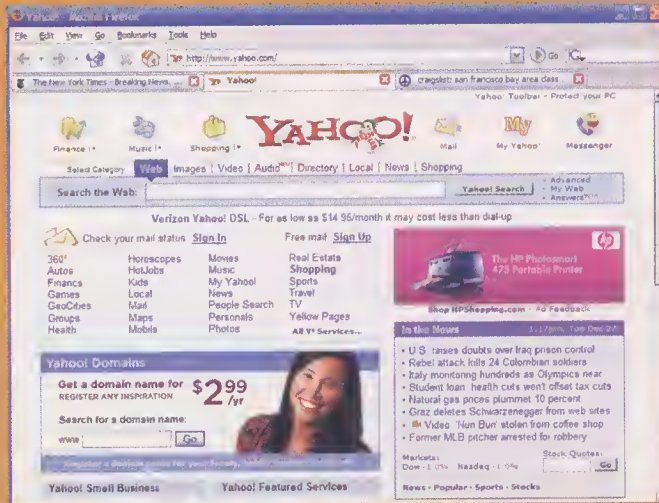
Despite being a niche product, Apple's critically acclaimed *Garage Band* also has a free alternative on the PC. Actually, it's a combination of two programs: *Audacity* (www.sourceforge.net/projects/audacity) and *Buzz* (www.buzzmachines.com). The former allows you to record and edit multitrack audio, while the latter lets you synthesize your own instrumentals and combine them with other audio tracks to make beautiful music. The catch? Neither app can hold a candle to the user-friendliness of *Garage Band*, and because they're free, community-based tech support is all you'll get. They're very potent tools, however, if you're willing to take the time to learn them.

You probably know that Windows XP lacks built-in DVD burning and authoring capabilities. Well, there's an easy solution to the first problem: *BurnOn CD&DVD* (www.burnworld.com/burnoncd dvd), a rudimentary burning app that allows you to burn data CDs and DVDs as well as video DVDs (though you'll need a separate program to create the requisite VOB files). The free version of *BurnOn CD&DVD* displays a pop-up ad every time you exit the program, but it's otherwise a fully featured program.

Unfortunately, if you're looking for a complete, well-rounded video-editing and DVD-authoring package à la *iMovie* or *iDVD*, you'll have to plunk down the cash for an app such as Adobe's *Premiere Elements* (www.adobe.com) or Pinnacle's *Studio Plus* (www.pinnacle.com). Alternatively, you could hold out for Vista and the new version of *Windows Movie Maker*, which is rumored to include improved editing capabilities and integrated DVD burning.



LEFT: Mozilla's *Thunderbird* email client boasts a junk-mail filter and other key features that *Outlook Express* lacks.



RIGHT: Step on up to tabbed browsing with the highly extensible *Firefox* browser.

MAKEOVER

Now we've added some much-needed features to Windows XP, but what can we do to make it look better? With a new theme or skin you can give Windows a hip new look!

Admit it: Looks matter. If they didn't, Britney Spears would be a convenience store clerk in Louisiana and more people would drive Volvos. The same principle applies to computers. Although Macs have many positive qualities these days, what do you think is the number-one reason cited by people who switch from Windows? Yeah, that's right: "The iBook is sooooo cute!" And on the software side of things, let's face it: Windows XP's Luna theme was attractive and modern back in 2001, but this is 2006, folks.

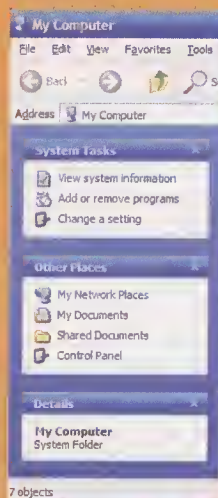
You probably won't have much luck convincing the folks at Dell and HP to stop designing ugly computers, but you can overhaul the appearance of your operating system with minimal effort. Our favorite OS-skinning application is Stardock's *WindowBlinds* (\$20, www.stardock.com), which lets you revamp the look of your entire GUI—Start menu, program windows, desktop icons, the works. *WindowBlinds* boasts a collection of literally thousands of community-created themes, but the latest version of the software also offers a special treat. On systems equipped with a 3D accelerator, *WindowBlinds 5* delivers a few of the slick visual effects of Windows Vista's much-touted Aero Glass UI, such as transparent window borders. It's also much less GPU-intensive than Vista will be—we experienced very smooth performance on a 4-year-old Radeon 8500 128MB videocard.

Does all of this sound too good to be true? Well, there are two gotchas. First, most of the skins available for *WindowBlinds* are created by amateurs, and it shows. We tested many top-rated skins from www.wincustomize.com, a popular skin repository, and although we stumbled across a few gems, the vast majority of the skins we found were downright garish. Sadly, as we were writing this article, a particularly stylin' skin that impeccably imitated Vista's Aero Glass UI was removed by its author on Microsoft's request.

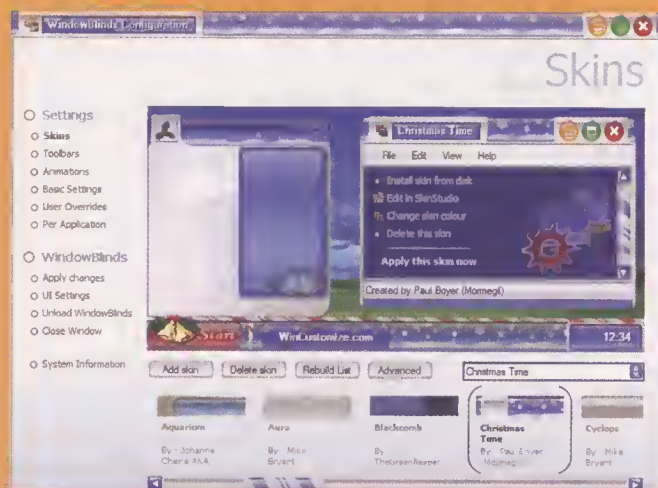
The other major catch of *WindowBlinds* is that, like any low-level OS modification, it has the potential to screw up your system. Our own experience was positive, but we've heard of cases in which *WindowBlinds* caused problems ranging from sporadic program crashes to the corruption of Windows XP's icon files. As such, we understand that many folks won't be comfortable installing such an invasive program.

If that describes you, you can still make Windows XP look a bit more modern. When Microsoft shipped Windows XP Media Center Edition 2005, it served up a new theme called Royale, which has since been made available (for free) to all Windows XP users. Royale is essentially a sleeker, more contemporary version of the Luna theme. Because it's made by Microsoft, it's a safe choice for those who don't want to mess with third-party window managers. To get it, head over to www.microsoft.com and search for "Royale"; it should come up under the title "Desktop Backgrounds for Windows."

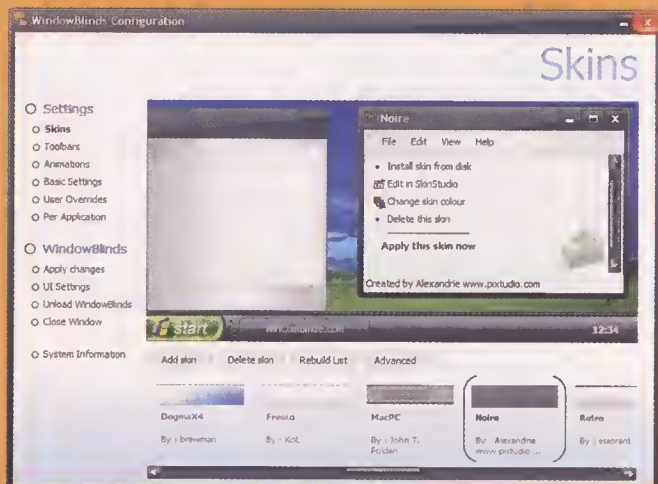
It's worth noting that aesthetics and productivity sometimes go hand-in-hand. An example of this is the venerable Alt-Tab feature, which by default simply displays a list of icons representing the programs you have running. Alt-Tab is handy as it is, but wouldn't it be even better to see a small snapshot of each program, so you could easily choose between the six instant messaging windows you have open? We sure think so. Luckily, the Alt-Tab Replacement PowerToy (visit www.microsoft.com and search for "power-toys") does exactly that. It's not quite the same as the Mac's Exposé feature or the Flip 3D view of Windows Vista, but it's definitely an improvement.



Microsoft's Royale theme for Windows XP is a slightly sleeker and more modern take on the Luna theme.



Keep the holiday spirit alive all year long with a *WindowBlinds* Christmas desktop theme.



Tired of Windows XP's bubbly UI? A chic black desktop theme might be just what you need.



The Alt-Tab Replacement PowerToy improves both the form and function of Windows XP, with handy previews of the windows you have open.

WIDGETS

What's a widget, you ask? Only the best thing to happen to computers since the Internet! OK, maybe not, but widgets are pretty damn cool. A widget is a small applet that resides on your desktop and culls the information you want from your computer and/or the Internet, presenting it quietly and attractively. This information could be anything from the latest baseball scores to a webcam displaying the current ski conditions at your favorite resort.

Widgets were popularized by a program called *Konfabulator*, which has since been acquired by Yahoo! and renamed *Yahoo! Widget Engine*. That's a good thing, because Yahoo! reduced the app's price to nothing! Yahoo! also maintains an online gallery of widgets for every occasion—more than 1,600 of them as of this writing. Have a look at <http://widgets.yahoo.com>.



Decorate your desktop with spiffy widgets to put all sorts of useful info at your fingertips.

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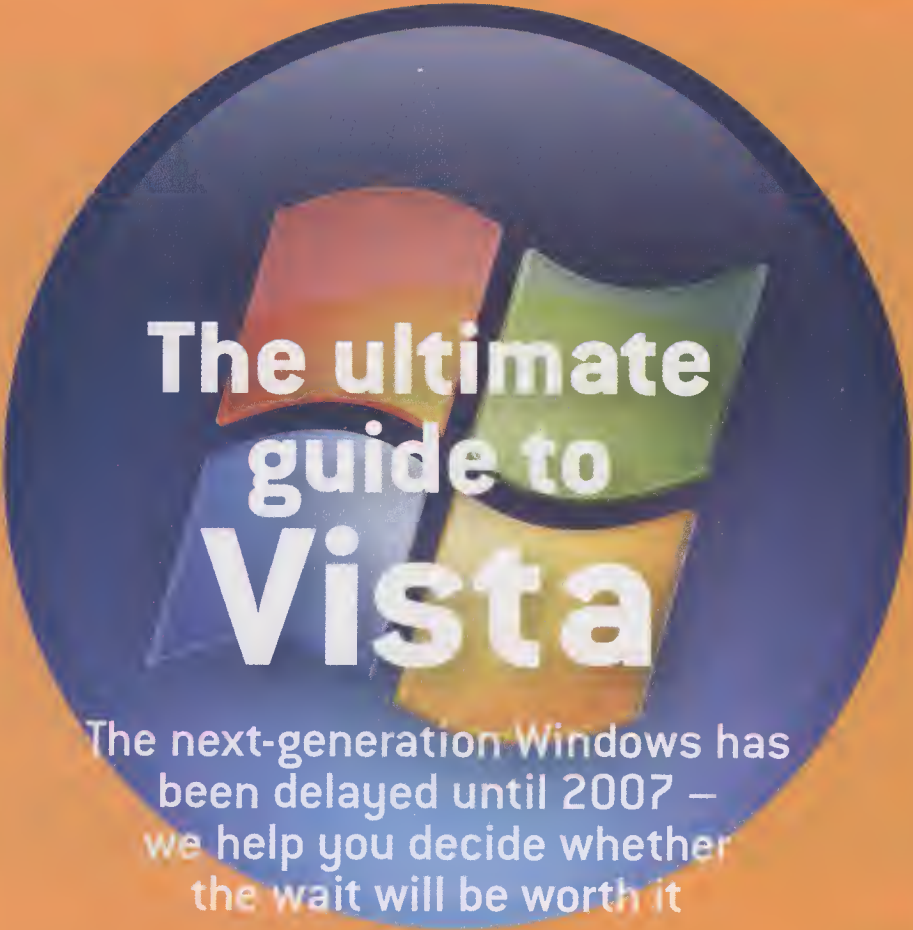
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The ultimate guide to Vista

The next-generation Windows has been delayed until 2007 – we help you decide whether the wait will be worth it

You don't need Vista. You also don't actually need a haircut, but sooner or later you'll want one, because the old one's getting messy and frustrating. A little more down the line, your buddies will actually start to mock you for your hideous, uncut hair. Even though you're by now utterly alone and taking eight showers a day in the desperate hope that the bad feelings will go away, you still don't actually need a haircut. Things would, however, be better if you did have a haircut. Come on now, come with good old *PC Gamer*. We're going to replace your tatty old hair... erm, operating system, with a nice, fashionable new copy of Windows Vista.

Before you sit yourself down in the chair and we drape a stubble-flecked towel around your shoulders, though, let's give you a quick run-through of what your options are. Vista is coming – though it has rather annoyingly been delayed until early next year now, and given how many other setbacks it's been subject to, that isn't a given either – but that doesn't necessarily mean the follow-up to Windows XP is definitely

for you just yet. So, for your consideration, here is *PC Gamer's* ultimate guide to the PC operating system of tomorrow – today. But is it worth the ever-growing wait? In absolute honesty, much as this magazine is about celebrating the PC and technological progress, right now we'd say no. It's a very attractive, modern-feeling operating system, but there's nothing in there that feels vital, and more importantly it's an

unacceptable resource hog in its current state – something due to be addressed if the Internet rumours (denied by MS) that a huge amount of Vista's code is in for a rewrite before its January release hold water. That said, it took a couple of years before Windows XP became an essential

upgrade over Win 98, so this is likely to be no different.

Incidentally, the basis for this guide is Windows Vista Ultimate Edition beta 2, build 5308. It's nearly complete, but nevertheless still very rough around the edges – which does at least mean we're fairly up to speed with the multifarious (but hopefully far less frequent) ways the finished product will crash...

"INTERNET EXPLORER IS NOW A CORE COMPONENT OF WINDOWS VISTA"



CLICK ME

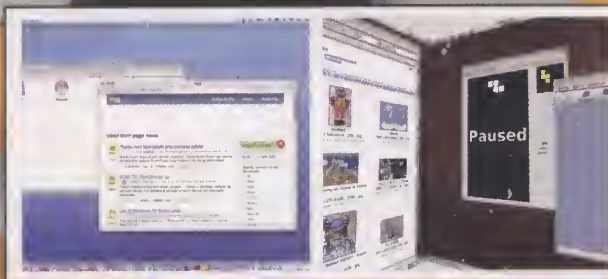
'Start' is dead and buried: in its place the soon-to-be ubiquitous Vista 'pearl'. Like application window borders, the task bar is now transparent. This serves no purpose other than to make the interface look prettier – which, in fairness, it does, as do small touches such as halo effects around buttons and a swooshy zoom as windows minimize and maximize.

GOING LIVE

If your PC's capable of the top-level Aero Glass interface, everything in Vista is rendered as a 3D object – meaning hoary old [Alt]-[Tab]ing between static program icons is replaced with either a 2D window showing a live preview of each running program, or, by pressing [Alt]+[Win Key], you get this stylised, scrollable roster of each app. In this example, we can actually see folk dastling around in both *World of Warcraft* and *Oblivion* simultaneously, and our DVD playing in the background. In the interests of fair disclosure, *WoW* crashed shortly after this.

PERIPHERAL VISION

Yep, the controversial Sidebar is back. Microsoft is talking up inter-compatibility between the Sidebar and Windows Live, its customisable homepage-cum-portal. You'll have access to all your news feeds and widgets both on your home desktop and from any web-enabled PC.



THE COMPETITION

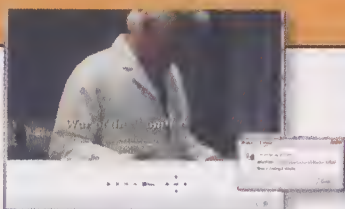
OSX 10.4, Tiger, is still soldiering on over on Macs, despite the recent switch to Intel processors. Given that many of Vista's features have only just caught up with OSX, we can expect the top-secret next Apple release to outdo Microsoft to some extent.

Over on Linux, a new tech called XGL has seen the first 3D elements introduced to the interface. It's technologically superior to Vista, if as yet less attractive on a purely aesthetic level.

Performance

So it looks the part and comes bundled with all manner of bonuses, both worthwhile and futile – but how well does Vista run?

Though almost everything in Vista 5308 works – an improvement on the last couple of builds we've dabbled with – this is still a beta, and we can't help but attribute the delay of the OS's release, at least in part, to the performance and stability problems seen in this latest version. Officially poooh-pooohed rumor-mongering has it that some 60% of Vista's codebase has to be fixed before launch, especially the Media Center component, which is indeed as flaky as a man going cold turkey on Head & Shoulders in this current build. All that said, PCG has been running Vista 5308 as one of our day-to-day operating systems for a while now, and despite a plethora of problems, it hasn't been an agonizing experience – there's definitely a sense of it being 'nearly there'.



PIRATE'S BEST FRIEND?

A surprising addition to the latest Vista build is Windows DVD Maker. It's surprising not because it's there, but because it isn't limited to just WMV files and Media Center recordings – chuck in MPEGs or AVIs you have codecs for, and it'll merrily transcode films onto a set-top box-friendly DVD. You can even set up menus and chapter selection screens. Which means that discs full of DivX episodes of *Lost* can be turned into a DVD. Encoding times will vary wildly depending on your processor, but you should be somewhere around the one hour mark on a fairly decent machine.

On DVD-related matters, a word of warning – some very old DVD drives (from six years ago or more) won't be able to play back video discs in Vista. Data reading will still be fine, and to be honest if you're trying to get Vista running on a six-year-old PC, not being able to play DVD movies will be the least of your problems...



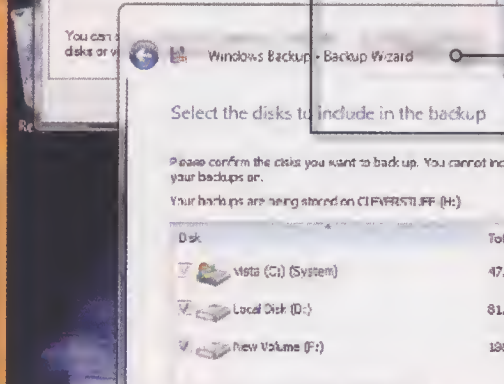
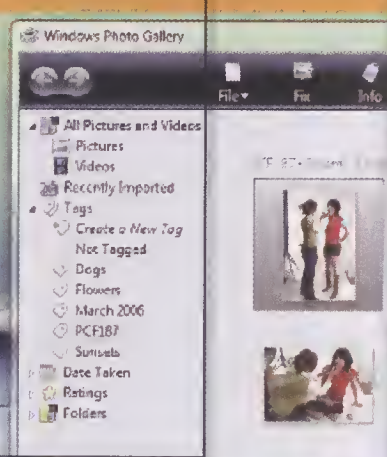
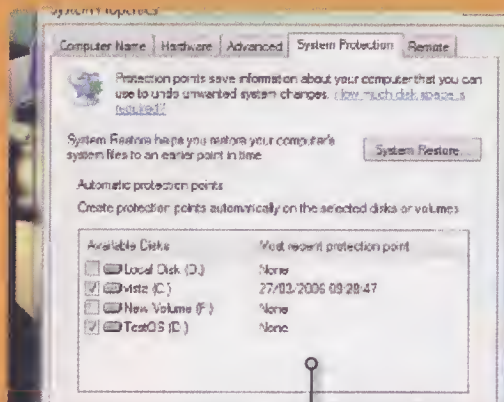
HOW DOES IT PLAY?

Vista is a hungry beast – even on our test rig with 2GB of DDR2 RAM, it managed to accrue a ridiculously huge pagefile of 1.2GB. This doesn't bode well for game performance, which is hard to gauge, due to the basic and outdated nature of the beta drivers provided for the DS by NVIDIA and ATI. However *Oblivion*, one of the most demanding game of the moment, ran acceptably, though slower than in XP. *Quake 4*, however, wouldn't even install, suggesting there'll be a whole lot of compatibility patches for well-loved titles soon after Vista's launch.



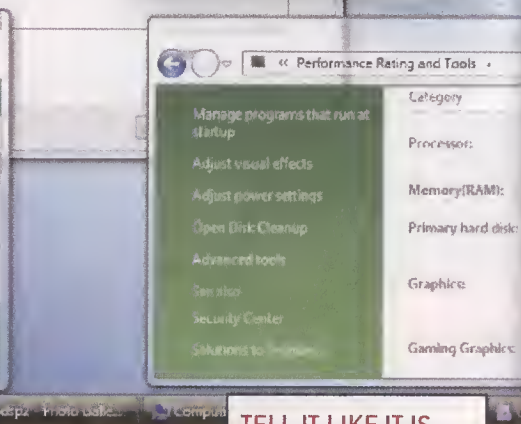
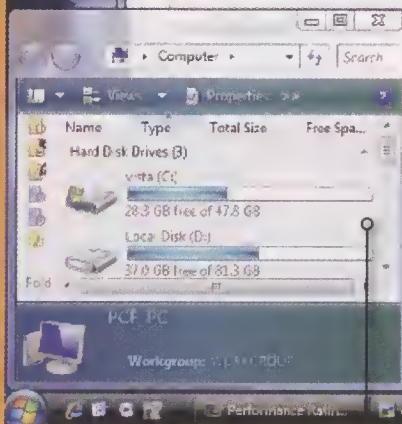
DRIVE DISASTER

The basic file backup app from XP has been vastly expanded, to the point where third party applications are doubtless quaking in their archived boots. That said, it's nothing hugely complex, but its automated scheduled backups will be more than enough for most folk.



SAVE ME

System Restore, an absolute lifesaver in XP to anyone who knew what and where it was, has earned a slightly more prominent role in Vista, though finding it remains slightly arcane. It's now under Control Panel → System and Maintenance → Backup and Restore, and also offers the option to protect or leave unmonitored individual drives rather than simply set the whole shebang on or off.

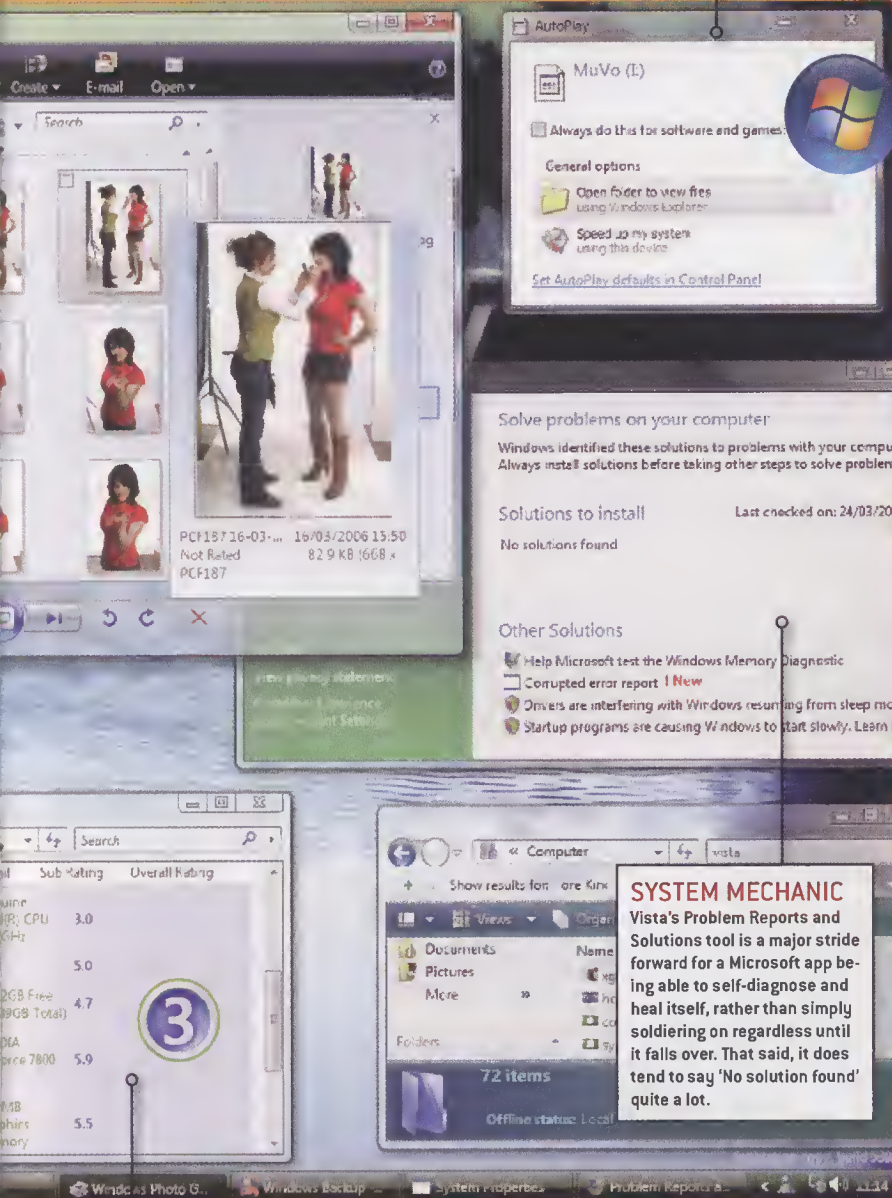


TELL IT LIKE IT IS

My Computer has been given far more visual appeal, so granddads can now gauge how much room is left on their drives without ringing up tech support to ask what a gigabyte is. The option to remove programs hovers usefully above, rather than in the depths of Control Panel, so clearing HDD room is far more intuitive.

SUPERFLY

Plug an external storage device into Vista, and it'll ask if you'd like to use it to 'speed up your PC.' While the idea of using a camera to get a better *Quake 4* framerate is ridiculous, the idea isn't without merit — Vista's Supercache technology uses your device as an alternative page file (so, if there's not enough free RAM, Windows uses a portion of one of your drives as 'pseudo' memory). A 1GB USB 2.0 flash drive, will cache data more quickly than your hard drive can, so will result in a minor performance boost if you can't afford more memory instead.

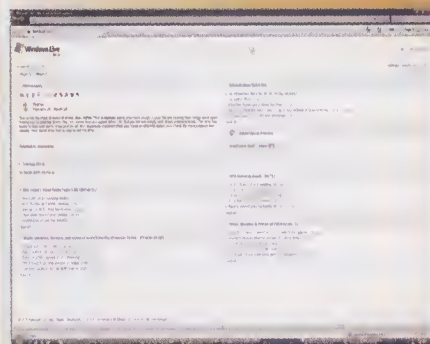


SING FOR YOUR SUPPER

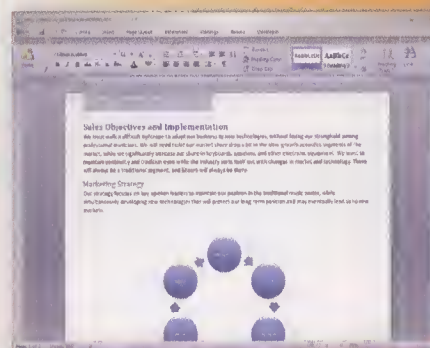
For the first time ever, Windows now includes a benchmarking app — of sorts. The performance rating gives your PC an overall score from 1-7, as well as sub-scores for CPU, RAM, HDD and 3D card. The plan is that apps and games will ship with a recommended minimum score on the box, so you have an easier idea of whether your PC's up to running them.



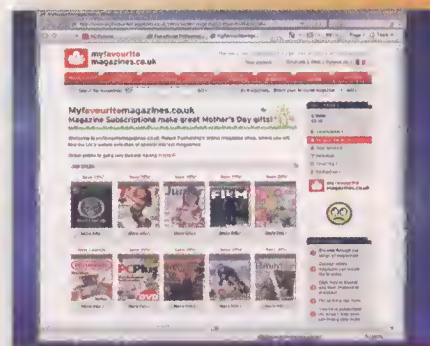
MEANWHILE... ELSEWHERE IN MS



1 Coinciding with Vista's roll-out is a suite of 'Live' services, essentially MS' play on the Web 2.0 remkt. You may have seen live.com already, a customizable homepage full of RSS feeds, inboxes and widgets. There's also *Live Mail*, a Hotmail replacement that apes *Outlook Express*.



2 For once, *Office 2007* looks to be far more than the traditional slew of baffling new features. The major change is a new UI, a big departure from the File, Edit, View layout of yore. Instead, core functions appear in a 'ribbon' of tabs, meaning it's easier to find essential functions.



3 *Internet Explorer 7* is famously a component part of Vista, but will also be made available for Windows XP. It's all too easy to label it a response to the growing success of Mozilla *Firefox* but, well, it is. Tabbed browsing, wider plugin support and increased security — notably a phishing filter — are its biggest deals.



Computer



vista



Recycle Bin

Actual size

Open your magazine up and hold it in front of your monitor. This is exactly the view you'll see early next year. Sans your own reflection, of course

VANGUARD

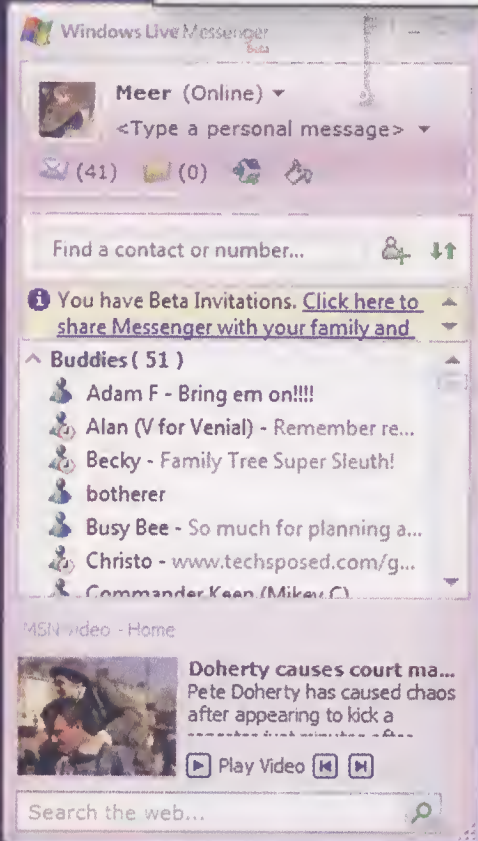
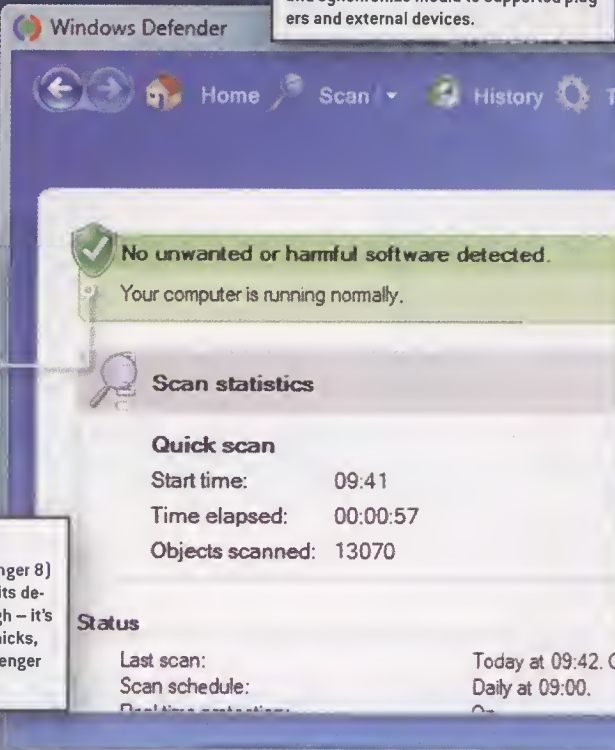
Here's Windows Defender in all its oddly subdued glory. If it's doing its job right, you shouldn't have to see this screen at all, but essentially it performs as any other anti-spyware app does.

TALK TO ME

Windows Live Messenger (formerly MSN Messenger 8) isn't an out-of-the-box component of Vista, but its design has elements in common. Not totally though – it's completely lacking in funky transparency gimmicks, which will hopefully be incorporated once Messenger makes it out of beta status.

LOUNGE LIZARD

Media Center – perhaps Microsoft's finest hour – is back, and this time it's standard in the Home Premium and Ultimate Editions. It's not a big departure from MCE 2005, but looks nicer and includes bonuses such as being able to burn discs and synchronize media to supported players and external devices.



CHILD'S PLAY

Minesweeper and Solitaire finally get an overhaul, complete with semi-3D effects, while a roster of new, achingly family friendly games also make themselves known. 'Proper' games that support Vista's new installer method will pop up with a high-res icon and publisher, developer and age-rating details.



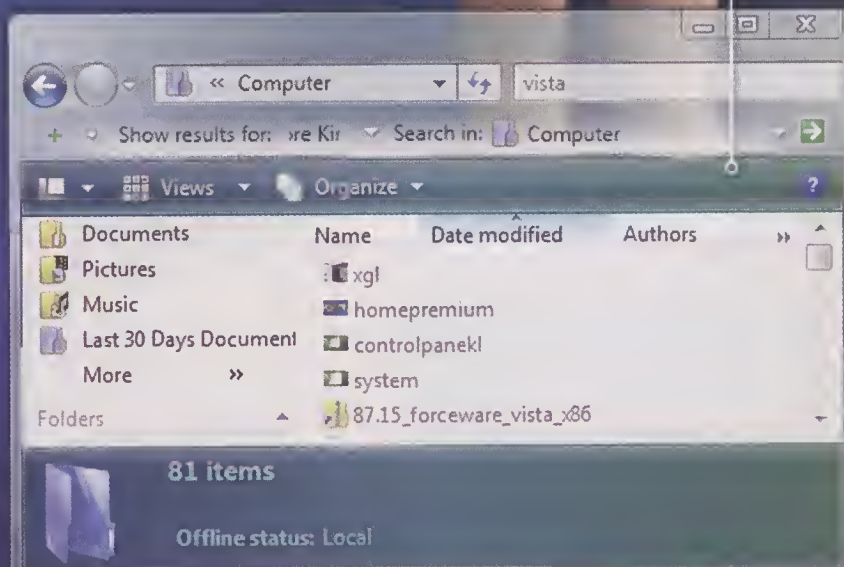


BEND ME, SHAPE ME

Those irked by XP's three equally hideous color schemes will be heartened to know Vista's appearance is far more malleable. Well, in theory – the trouble with transparent window borders is that they're, well, transparent. You can, however, choose whichever exact hue you want them to be, and even adjust their opacity to suit your tastes. Interestingly, Vista uses the same Themes system as XP, so third-party skins should appear very swiftly.

NEW SEEKERS

Here's Vista's Desktop Search app. Just type a word into the default box and it'll bring up both files that contain it in their name and also any emails, documents, instant messages and the like that mention it.



Evaluation copy. Build 5308

What's new?

Vista looks to make giant leaps over its Windows XP predecessor. What are the new features, and do they make the new OS a must-buy?



Our first impressions of Vista are that it's very much XP with a facelift. But then, that's to be expected – people are very much used to how Windows works after all these years, hence a major departure from its basic operation might have been a mistake. On taking a look under every rock and behind every picture frame, though, there's a whole lot of new technology beaver away behind the scenes. Take, for instance, item-specific restore. Right-click on any file or folder, select Previous Versions and Vista will dredge up a prior copy of it – perfect if you've made a major change to a document and want the original version back, or perhaps restoring a *Half-Life 2* savegame you'd inadvertently overwritten.

LOST AND FOUND

QuickSearch is an long overdue addition to Windows, performing the same function as Google Desktop Search and Apple OS X's Spotlight. To be honest, there isn't a huge amount to report – as with GDS, type in the name or partial name of your desired file or information, and the results pop up near-instantly, instead of after the laborious trawl to be found in XP. A neat touch is a drop-down list of search types, be it images, instant messages or appointments in your calendar – it's a gentle nudge to stop thinking about the con-

"Vista may not be as aggressive to unwanted software as other apps are"



Plug in a second monitor, boot up Vista and it'll ask whether you want to span or clone your desktop.

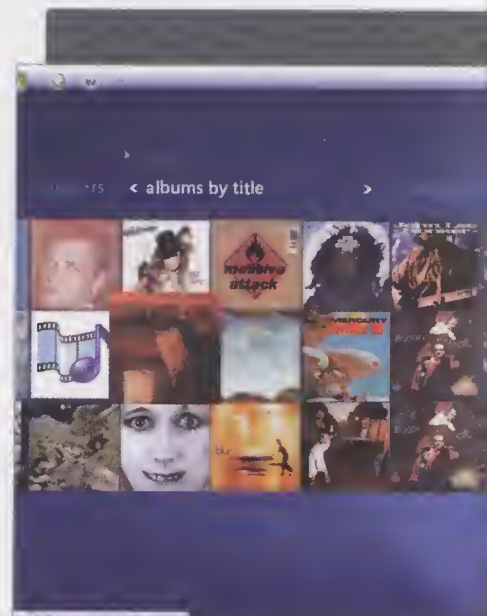
tents of your PC as files and folders kept in and accessed from specific locations, but rather as simply forms of information you can access from anywhere at will. It'll take some getting used to – we still can't quite resist the temptation to hit [Win Key] + [E] and navigate over to a desired folder, but it has the potential to be nigh-on revolutionary once users are used to it.

If ease of access to information is one of Vista's watchwords, then security, the perennial bogeyman lurking under Windows' bed, is surely the other. Experts speculate that Microsoft's need to ensure Vista is as safe as houses is partially responsible for the launch delay. While MS operating systems have a long history of potentially dangerous vulnerabilities, that's not to say it's no safer than XP in its current state. For starters, you're no longer running in Administrator mode by default, meaning any

non-official process or program that tries to run should have to ask your permission first. In practice, it's slightly irritating, resulting in a near-constant barrage of question windows about everything from installing new programs to running Control Panel items; there is the option

to run in Admin mode, but the first time you're given the option to prevent a piece of malware from rubbing itself all over your registry, the pestering will doubtless seem worthwhile.

Windows Defender is the source of this malware paranoia. It's both an expanded version of Microsoft Anti-Spyware and the hub from where you can alter how choosy Vista is about what you run without being presented with a permission box. To be honest, interacting with it isn't essential. The level of protection it offers is comparable to that of third-party apps such as Spybot, and Microsoft's recent actions suggest it may not be as aggressive towards unwanted software as other apps are. Meanwhile, Windows Firewall has had a much-needed overhaul, crucially now monitoring outbound as well as inbound web traffic, so it can prevent



1

Home Premium is probably what you'll be after, and the version that should be at the around same price point as XP Home currently is. The Aero Glass interface survives intact, as does Media Center and the bonuses, such as the photo gallery and movie editing apps.

your data being sent to decidedly insalubrious third parties without your knowledge.

XP: THE SEQUEL

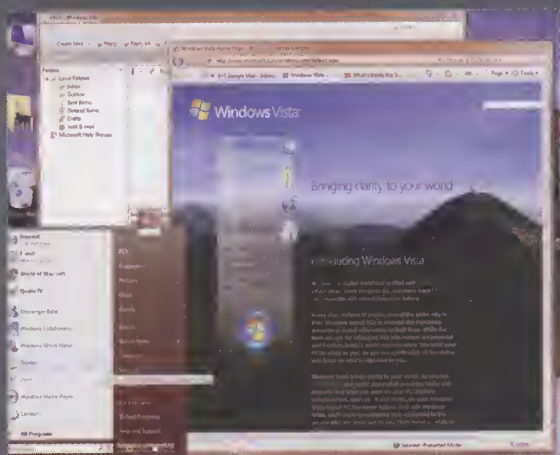
Elsewhere, *Windows Movie Maker* and *Medio Player* have both received overhauls, the latter sporting a look and interface far more in keeping with the rest of the operating system than *WMP 10* managed with XP. Vista's instant Search is fully integrated into it, as is the breadcrumb navigation bar. There's also tantalizing promises of an online store, sure to offer video as well as music downloads.

Then there's the slightly bizarre but potentially helpful *Windows Collaboration*, which enables other folk on the same network as you to login to a session wherein you can demonstrate various applications or presentations to them. At the time of writing, only the Sidebar worked over Collaboration, despite promises of being able to share the entire desktop. Should this eventually come to pass, the app could be subverted so that multiple people on a wireless network could all watch the same movie as it plays on one PC – perfect for those moments where there's no more space in the front room for a couple more people to attend your high-def screening of *Weekend of Bernie's 2*.

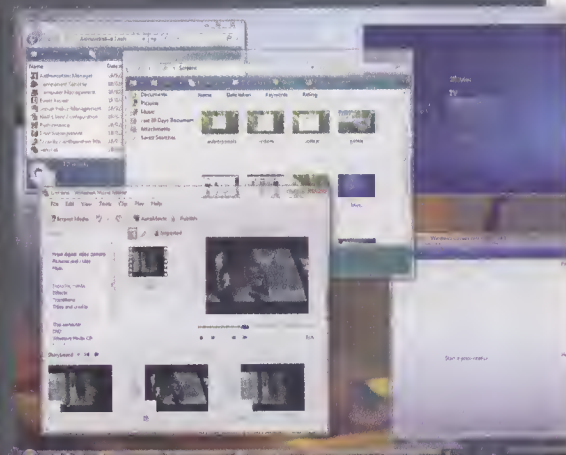
Of course, not all of these new features – and those on the following pages – will be included in every version of Vista. See our guide to the different editions above...

Which Vista?

Choose your own operating system...



2 Home Basic will be yet another jip for purchasers of those \$500 crapbag PCs cropping up in supermarkets, this is a no frills, no 3D effects, email and word processing-centric take on Vista. IE7, Windows Defender and desktop search are included, at least.



3 Vista Business and Enterprise aren't aimed at leisure users, so will be lacking some of the 'fun' elements in favour of drive encryption and an emphasis on multiple users. Ultimate combines Premium and Enterprise, thus appealing to the home business owners.

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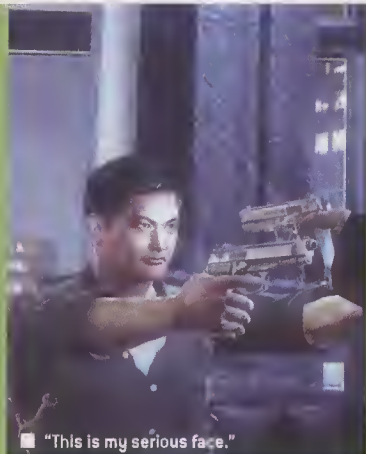
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STRANGLEHOLD

➤ Guns akimbo

In this unofficial sequel to director John Woo's Hong Kong action-film classic *Hord Boiled*, you control a stunningly realistic Chow Yun-Fat avatar (reprising his role as Officer Tequila), navigating the highly detailed, highly destructible environments via "stylish" moves. Hold down a button (we played with an Xbox 360 controller) as you approach nearly any stationary object, from a balcony banister to a tea-house table, and you'll likely walk up it, slide across it, or somersault over it, all while brandishing your character's signature dual-wielded arsenal.

Enter "Tequila Time" to slo-mo the world while you aim and shoot in real time, or rid a room of bad guys with a "Tequila Bomb" finishing move, such as spinning in a circle while pumping bullets from guns in both outstretched hands... all while Woo's *de rigueur* doves flutter at Tequila's feet. One concern: we couldn't get a satisfactory answer about how the controls will translate from the controller to a mouse and keyboard, but seeing as how *Max Payne* managed it fine five years ago, we're confident Midway will get it right.



■ Officer Tequila hams it up in *Stranglehold*.



DEVELOPER TimeGate/Monolith PUBLISHER Vivendi RELEASE Fall 2006

FEAR: EXTRACTION

➤ Girls just wanna have fun

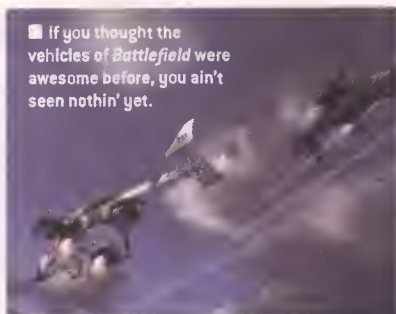
The story picks up right where *F.E.A.R.* left off—with a very P.O.'ed Alma bringing down the chopper that lifted you and your surviving teammates out of what was left of the Armacham complex. You wake up among the wreckage and have to leg it to—you guessed it—the extraction point. Between you and your goal are all manner of supernatural demons and the remains of the Armacham clone army, reanimated by Alma's will.

You might recall the mini-gun that makes its debut in *Extraction Point* from the *PC Gamer* preview a few months back. Well, we got to take that baby for a spin (no pun

intended) and wow—that's enough firepower to shake your fillings out! And when you drop into slow-mo, it's a sight to behold. Even the new enemies we encountered, the stealthy living shadows with glowing eyes, weren't safe when we unleashed its fury shredded everything unlucky enough to be in our path. However, our homicidal frenzy was tempered when we ran out of ammunition and had to switch to the more conventional HV Penetrator stake gun to get us through the rest of the demo level. When Alma herself started walking towards me down a long hallway, we knew the demo was ending, one way or the other.



■ If you thought the vehicles of *Battlefield* were awesome before, you ain't seen nothin' yet.



DEVELOPER DICE PUBLISHER EA RELEASE Fall 2006

BATTLEFIELD 2142

➤ Back to the future

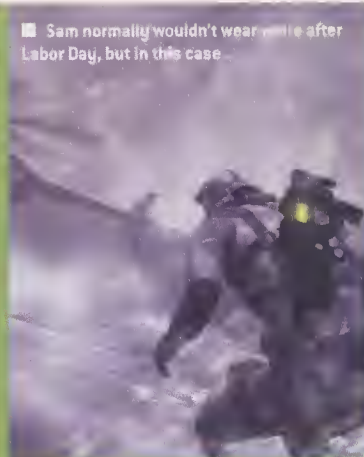
Before the dust had even cleared after the completion of *Battlefield 2*, DICE had begun work on the boldest iteration of the *Battlefield* franchise yet. No strangers to muffs and insulated parkas, DICE's Swedish team envisioned a future where a new ice age has left human survivors battling over the scant remaining arable land, but these battles will be fought with much scarier weapons than humanity has ever known. Like the kind that rattles the ground as it squishes mobile infantry underfoot.

Even though it's built on the foundation of the *Battlefield 2* engine, EA showed off some of the ways DICE has refreshed and renewed the gameplay for this version, unveiling the spectacular new Titan mode. Teams must defend their shielded, airborne aircraft carrier while attempting to down the other team's ship by launching troops in boarding capsules from APCs. Woot!



■ Does that chopper remind anyone else of SkyNet?

■ Sam normally wouldn't wear a mask after Labor Day, but in this case...



SPLINTER CELL: DOUBLE AGENT

➤ Uncle Sam wants YOU!

As Defense Secretary Donald Rumsfeld once said, there are known knowns. We know, for example, that agent Sam Fisher has a new bad-boy haircut. We also know that in order to foil a fresh crop of terrorists, he must go undercover and infiltrate their organization. And we know that Fisher will receive simultaneous assignments from the bad guys and the good guys, and that some of these assignments will be in direct conflict with one another. And we also know that *Splinter Cell Double Agent* will give players more pathways to completing an objective than in any of the franchise's previous games.

And then there are known unknowns. We know we do not know to what extent the choices you make about conflicting assignments—what Ubisoft was calling "directed moments"—will affect the game. But given the already slick look of the *Double Agent*, we can't wait to find out.



■ VISIT...BEAUTIFUL...SHANGHAI!

HALF-LIFE 2: EPISODE ONE

➤ The most anticipated expansion pack ever

■ Both Alyx and Dog return for *Episode One*, with the former playing a large role in the story.

HEALTH 97

DEVELOPER Valve Software PUBLISHER Valve Software/EA RELEASE Available Now

PREVIOUSLY, ON HALF-LIFE 2...

When last we saw Gordon Freeman and his sidekick Alyx Vance, they had cornered Dr. Breen, the human face of the Combine occupation. Breen's only escape was to beam himself to the Combine home world. Gordon destroyed the transport portal, stopping Breen, but in doing so, inadvertently triggered a reactor meltdown. As the blast was a mere microsecond away from incinerating our heroes, Gordon was teleported away by the G-Man. The fate of Alyx remains unknown.

And now, the exciting conclusion...

If you think of the original *Half-Life 2* as a network's movie-length pilot for a television series, then *Episode One* is the first episode in a (hopefully) long-running series of shorter installments. In the TV world, these debut episodes hardly ever sing like a series' later offerings: we're still getting to know the characters, perhaps the writing hasn't gelled, or maybe the new episodic format hasn't yet transcended its plus-sized beginnings.

In the case of *Episode One*, the latter is true. Weighing in at 4-6 hours of gameplay (and selling at the comparably low price of \$19.99), this standalone game picks up immediately from the end of *Half-Life 2*, answering the question "What happened to Alyx?" but very

little else. Instead, the plot sends you and Alyx back into the Citadel to clear up some unfinished business before evacuating City 17 with the rest of the residents.

Make no mistake: this episode is told with all the flair, action, and inimitable expertise that made *Half-Life 2* sizzle. Alyx's character has never seemed more alive than she does here, which is a true accomplishment for a shooter. And, because of its brief length (and liberal use of scripted sequences), *Episode One* seems to whisk you from event to event with the breakneck velocity of a rollercoaster. (One bit in the beginning where Alyx's pet robot Dog throws you into the Citadel is a fun-house ride all its own.)

That *Episode One* feels like a deleted scene from *Half-Life 2* is unfortunate. You're still in the Citadel and City 17, shooting zombies and whacking headcrabs with your trademark crowbar (presented winkingly to you by Barney). While puzzles, physics-based and otherwise, have been ramped up, there's little new here to truly make *Episode One* stand out. Yes, the gameplay is feverish, but we wish there were more of the new scenery, monsters, and experiences that are planned for *Episode Two*.

■ The evil Dr. Breen also returns to try and foil Gordon's plans.

A big selling point for *Episode One*, however, is Valve's developer commentary mode. After completing the game, you can replay it and, by clicking on commentary nodes, hear the designers tell you firsthand about their design process, share fun bits of trivia, and explain the "why's," such as why Dog shakes his head at Alyx during one conversation. For anyone who loves videogames, it's fascinating.

Episode One also comes with *Half-Life: Source* (the classic original remade in the Source graphics engine), but only water and reflective surfaces benefit from the upgrade in tech. And yes, Steam must be installed to run the game. Still, while this inaugural episode may not be the essential FPS that *Half-Life 2* is, we can't imagine any shooter fan who'd want to miss it.





■ In the words of the great Worf, "Assimilate this!"



DEVELOPER Mad Doc PUBLISHER Bethesda RELEASE Fall 2006

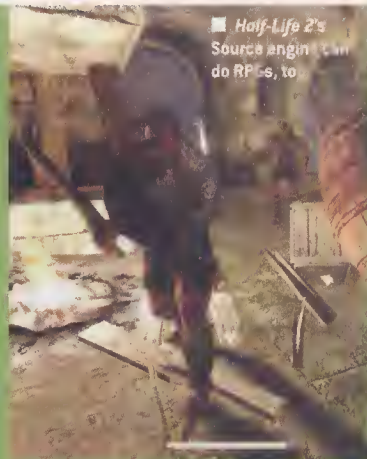
STAR TREK LEGACY

► Boldy going where...oh, you know the rest

This is shaping up to be the first great *Star Trek* game since *Elite Force*. We got to play a short demo that reenacted the Mutara Nebula battle between the Enterprise and the Reliant from *Star Trek II: The Wrath of Kahn*. Then, after defeating Kahn and warping away from the Genesis Device explosion, we jumped straight to the *Next Generation* time period to lead a task force made up of Galaxy, Sovereign, Intrepid, and Defiant class ships to defend Deep Space 9 from a fleet of attacking Romulan Warbirds and scout ships, with the help of our Klingon allies in Birds of Prey, Vor'Cha cruisers, and even a Neg'Vhar battleship. The battle was a fierce light show of spectacular weapons fire and shield flares, with ships taking damage exactly where they were hit and eventually exploding like a space piñata – it looked almost as good as the battle scenes in the later seasons of *DS9*. Things abruptly took a turn for the worse when a Borg tactical cube showed up, and we joined forces with the Romulans against our common foe.

We're particularly pleased with the way the controls are set up. We personally commanded one ship at a time, but could easily coordinate attacks with all four ships from that view or by zooming out to tactical view and giving orders. Combat tactics play out less like aerial battles and more like strategic submarine skirmishes, where you must keep your strongest shields facing your enemy while lining up your weapons to target his weakest. Mad Doc understands how *Star Trek* combat should be!

■ Control Federation ships from every *Trek* era. Red alert!



■ Half-Life 2's Source engine can do RPs, too

DARK MESSIAH OF MIGHT AND MAGIC

► Nothing like that other Messiah game

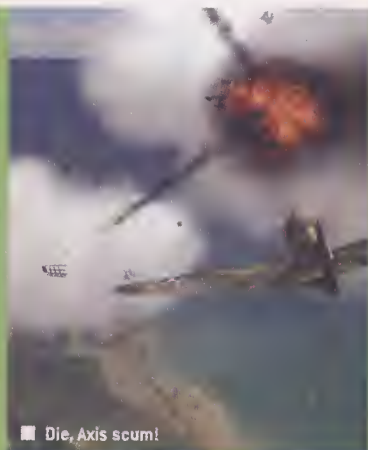
We've seen *Dark Messiah* several times recently, but recently we were finally able to play it. The developers placed us at the maw of an enormous cavern and then set us loose. Inside, we found a hulking Cyclops who looked none too happy to see us!

What made this boss encounter so entertaining was not only the several different ways of slaying the mighty beast available to me, such as going straight for the single vulnerable eye with our bow or trying to knock him down to get in close for a killing blow with our sword, but the crafty critter knew how to use parts of the environment to our disadvantage. At one early point in the confrontation, we hid under two huge boulders for protection, only to have him run over and heave them both aside, exposing the tasty PCG editor filling within!



■ Mmm, first-person RPG goodness...

DEVELOPER Mithis PUBLISHER Eidos RELEASE Fall 2006



■ Die, Axis scum!

BATTLESTATIONS MIDWAY

➤ You sunk my battleship!

Battlestations Midway...this game looked kinda homely when we first saw it, like a T-shirt that had seen better days. But since then, Mithis dropped its support for old-generation consoles and pumped the graphics up—way, way up. It's now a first-rate WWII naval combat game that puts you in charge of a whole fleet of ships, including destroyers, battleships, submarines, and aircraft carriers (along with the fighters and torpedo bombers they carry). You control one ship or plane directly, and give orders on the tactical map for the AI to follow as you battle the Imperial Japanese Navy in the Pacific. The combination of planes, surface ships, submarines and tactical overview mode makes for some extremely diverse gameplay to nurture your inner war hero.



■ By land, sea, or air, Mithis is there.

■ GRAW supports AGEIA's PhysX physics processor, which makes explosions like this even more impressive. Unfortunately.



DEVELOPER Nival Entertainment PUBLISHER Ubisoft RELEASE Available Now

HEROES OF MIGHT AND MAGIC V

➤ The title for the strategy gaming masochist

The Heroes of Might and Magic series has always been one of our favorite guilty pleasures because it's always so good to be bad in these games. *Heroes V* is the most evil-ly fun chapter yet, with a dark graphical makeover that really appeals to our inner demon.

In case you missed the first four titles, *Heroes V* is a turn-based strategy game in which you explore an adventure map with hero characters, uncovering the fog of war and gathering resources to build up your forces (gold, timber, artifacts, etc.) whilst combating enemy heroes that are doing the same. When you encounter an enemy hero or a group of neutral monsters, the game switches to a chess-like battle mode in which both sides square off against one another on the battlefield. Each creature in your army takes turns moving and fighting until you or your enemy retreats or is annihilated. Armies are comprised from a generous stable of 80 creature types spanning six factions (three good and three evil).

If you're not afraid of a challenge, *Heroes V* is a fantastic value. With six campaigns and 30-plus missions—many of which can take several hours to complete—there's a lot of turn-based action here. Plus, its multiplayer offerings have been dramatically improved over its predecessors. Hot seat, LAN, and Internet play are offered for up to 8 players. A new Ghost Mode allows you to explore the game map, gather resources, and even attack enemy ghosts, heroes, and monsters while your opponents move their heroes. And a Dynamic Combat Mode (available in single-player and multiplayer) places a strict time limit on each creature's turn in battle, dramatically speeding up the action.

■ Turn-based strategy gaming is alive and well, as *Heroes V* proves.



■ Slick 3D graphics and great physics help make *Titan Quest* the best action-RPG since *Diablo II*.



DEVELOPER Iron Lore PUBLISHER THQ RELEASE Available Now

TITAN QUEST

➤ Who is this "Diablo" character you speak of?

While it saddens us to report that there won't be a new *Diablo* sequel for action RPG fans to dive into this year, *Titan Quest*, with its gorgeous bump-mapped 3D graphics and liberal use of physics that allow you to impressively knock slain baddies into the air, has quickly proven itself to be the next best thing.

Prior to its release in PCG's hands-on preview, we mentioned that *Titan Quest*'s skill tree system, though robustly allowing you to build highly customized player characters, wasn't as intuitive as it should be. Thankfully, Iron Lore has since made several subtle improvements to it that should remove the risk of confusion for new players. They seem to have worked, because since its release we haven't been able to stop playing it!



■ The sheer number of character class combinations will make your head spin.

■ It's just one of those games you just know will be awesome.



DEVELOPER Obsidian PUBLISHER Atari RELEASE October 2006

NEVERWINTER NIGHTS 2

➤ Hands off my module!

Accessibility is the watchword for *NWN2*, and we are all luckier for it. In a bid to "de-dork the RPG" [quoth the developers themselves], the sequel to one of the best RPGs of all time employs cinematic dialogue and an optional over-the-shoulder camera that will more deeply immerse even those unfamiliar with the D&D world. Also new: interface alterations, such as one-button access to all spells, and an included visual effects editor that should give giddy modders more control over the world's aesthetics and allow for more interesting (and obvious) spell effects. Easier implementation of D&D rules has even piqued our interest, even though we've heretofore spent very little time around a 2D-sided dice. Who knows—we could be LARPing in no time.



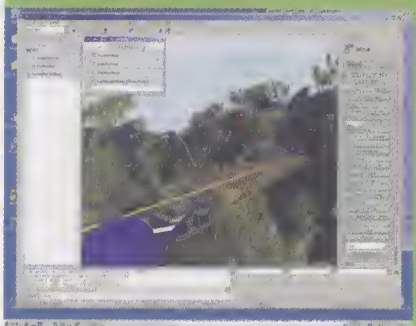
■ Prettiest D&D game ever? This guy says so.

WE INTRODUCE TWO
SIMPLE WAYS TO
MAKE *BATTLEFIELD 2*
EVEN BETTER

BF2 Combat: The Battlefield 2 Tour of Duty, online at www.bf2combat.net, is a new way to play *Battlefield*. It revolves around member-commanded armies which meet twice a week in huge 12-hour battles. These affect the outcome of the war and impart members with the sense that they're doing something constructive. One of the community's most innovative aspects is member-led training, which will teach you thing about *Battlefield 2* you definitely didn't know. For hardcore fans of the series, BF2 Combat offers equally challenging options, like Army Ranger School, led by ex-Army Rangers, and Combat Medic School. The Tour has a large following, and continent-specific divisions are available. There are also dozens of ranked servers in Europe, costing gamers less than four bucks a month each. The Tour also offers Special Forces junkies additional trigger time, and will allow members to use the two new booster packs when they're available.

The BF2 Ranked Server program, at www.bf2rankedservers.com, is the only EA-endorsed ranked server administrator. With over 11,000 slots running, it's doing a phenomenal, not to mention extremely popular, job. If you're interested in improving *Battlefield 2* or just want to play on a

server without the irritating newbies or hoggers, we recommend you check out their site.



Roll up your sleeves and get ready to go to work; it's map-making time!

Design maps for Battlefield 2

STEP

1

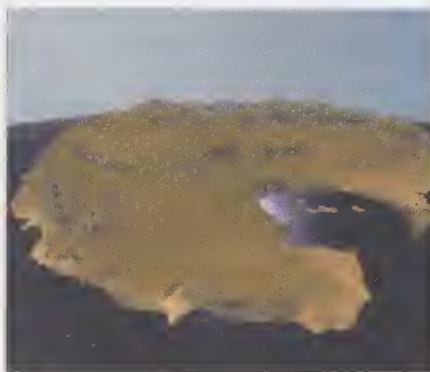
➤ Create your own theater of war in moments

Way back when, a game called *Battlefield 1942* captured the hearts of gamers by delivering non-stop action by land, sea, and air. EA also took us back to the Sixties with *Battlefield: Vietnam* before taking on modern day warfare with *Battlefield 2*, the series' best tour of duty yet.

There's a problem, though. *BF2* doesn't include a huge number of maps, and the recent expansion pack, *Special Forces*, only

introduced another eight. Fortunately for *BF2*, DICE Canada built a mapping package, so you can create your own playgrounds. It's brimming with features, but it's not easy to master, so we're going to design a small island map. We'll teach you how to use the editor, create a height map, texture, and paint the level. For experienced mappers, Token's terrain painter, *BF2 Map Editor*, is recommended (<http://bfeditor.org>).

MILITARY MAPPING

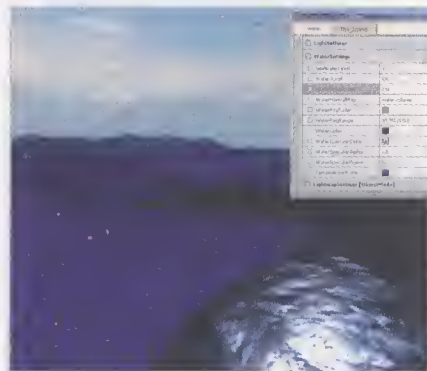


1 Over the next eight steps, we will help you to create a simple island map like the one shown above. We will split the island into plateaus with a limited number of paths. It helps to have an image of what you want your island to look like in your head before you start painting.

"We'll teach you how to use the map editor to create and paint your own playable level of *Battlefield 2*."



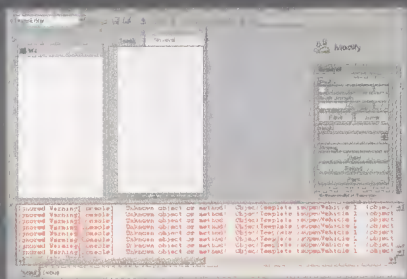
2 Once you outline your terrain, use a small brush for detailing. Apply the smoothing brush to paths where players will walk. Flatten the terrain with the level or platform brush where you will place buildings. Use a modify brush and the smooth brush to round off hard edges.



6 Paint the ground with a grass color and detail texture and the steep hills with a rock color and detail texture. Creating realistic looking terrain is painstaking, but with practice makes perfect. Once you have painted an area, click "Set Low Detail Texture," then "Generate Low Detail Textures," voila.

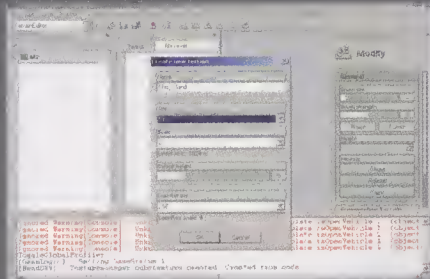
The basics

Your first steps to creating a believable landscape



1

The BF2 editor contains several context sensitive windows. Below the menu is the toolbar, and on the right is the editor window. The toolbar and the editor work together. The Tweakbar lets you change options for the resources.



2

Start by selecting the Terrain Editor from the toolbar, then New from the File menu. We recommend making a small map with a small scale. Size determines the dimensions of the height map, and Scale determines the size of each square in metres.



3

Before starting, select Grid Mode from the Render menu. Use the Modify brush to raise and lower terrain. The level and platform brushes are similar, but right clicking with platform lets you set terrain height. Use Random to make terrain more realistic.



3

Our island needs water, which you can set in the Tweakbar. Raise the water level from the default -1000, change the WaterColor to a dark blue, the WaterSpecularColor to a light blue, and set a WaterAnimSpeed for a ripple effect.



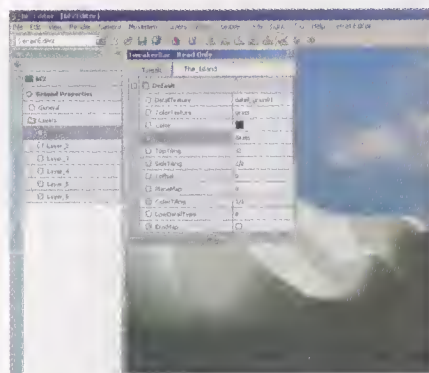
4

To texture in the editor, first define layers in the resource bar. The editor supports six different layers per map. First you have the color map, with a low resolution texture. You then set a detail texture and a material, which determines the layer's physical properties.



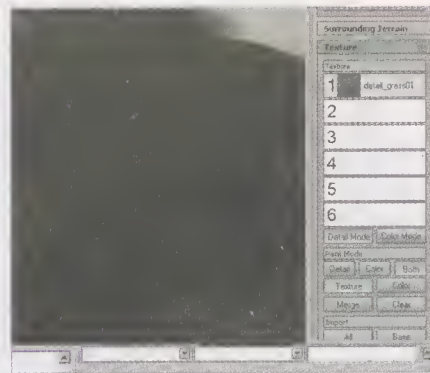
5

Now you can start painting. Chose Both in the Editor window to make sure you are painting to both the color and detail maps. Start by using a full power, large brush and use a smaller, weaker brush for blending. Finalize your painting with the Merge button.



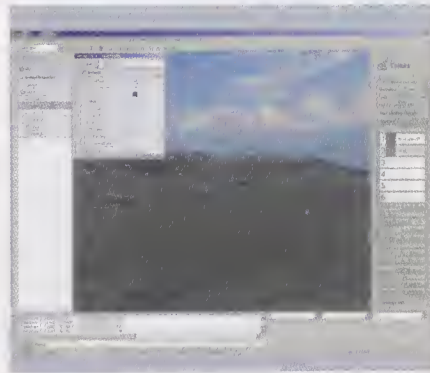
7

Texturing a whole map by hand is a slow and time-consuming process, but there are tools out there that can make your life easier. We tried out many programs but the easiest one we found is Token's BF2 Terrain Painter, which is simple and will save you hours of work.



8

Now for some vegetation. Press Render + Draw Undergrowth and Render + Draw Overgrowth. To create new undergrowth materials click on the Resource bar. You also need to define a mesh, a texture, size density and distribution of each element or group of elements.



9

Take a moment to savor what you've accomplished. Try looking at a stock map for some ideas and techniques. Also read the BF2 Editor guide for help with the tool, and check out the mapping community at www.bf2modding.net.

WE GIVE YOU THE SKINNY
ON THE BIG *BATTLEFIELD 2*
PATCH...BECAUSE YOU
NEED TO KNOW!

With the big patch out of the way, we're taking time to update newbies on what to expect. We sat down with a few lucky members of *BF2* Combat: The *Battlefield 2* Tour of Duty, www.bf2combat.net (which we showcased last month), whom DICE invited to give a tour of patch 1.2.

Version 1.2 fixes most of the irksome elements of *Battlefield 2*: players can no longer shoot while jumping, dolphin dive, prone spam, or sprint exploit. You can also now reload while sprinting. Engineers, medics, and special forces can retrieve mines, medpacks, and C4 respectively, but can no longer toss while jumping. The server browser is fixed, permitting filtering. EA and DICE also modified support and sniper kits, augmenting lethality. Grenade launchers, commonly known as "noob tubes," now have smaller explosive radii and a minimum distance before arming.

As dedicated gamers know, major patches often stir controversy, and 1.2 is no exception. For starters, the reduction in the potency of air power is undeniable. This build will affect pilots and gunners dramatically, which has a profound effect on clan and Tour of Duty tactics. But DICE certainly knows what they're doing, and when the dust finally settled, we knew that 1.2 was a better gameplay experience than what we got out of the box. Now what about version 1.3...?



If you find yourself in this position, it might be prudent to get off the carrier.

Battlefield 2 mapping guide

STEP

2

➤ Making your map playable

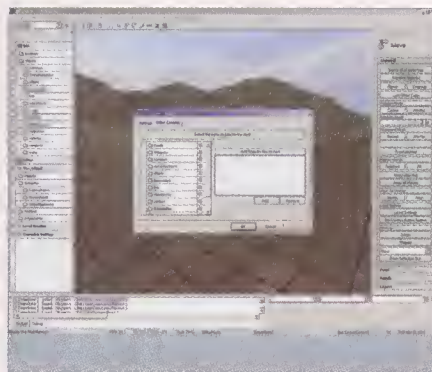
After step one of this tutorial, your *Battlefield 2* map should be taking shape. Player-created content drastically increases the popularity of online games, and *Battlefield 2*'s fanbase is crying out for good new maps – so your work in this tutorial could be in high demand.

In part one, we discussed the basics and sculpted land using the Terrain Editor. This step moves us on to placing objects, like

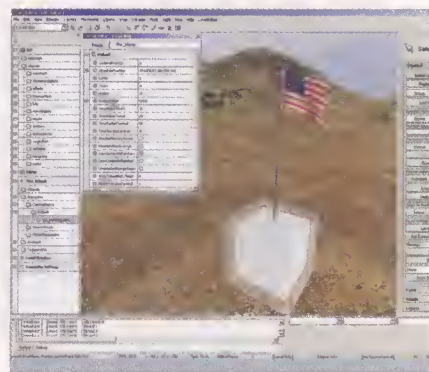
command points and buildings, and reading your map for play. By the end of this part of the guide, and with a bit of practice, you'll be able to create functional *BF2* maps.

For this step you can use the terrain we made in part one, a stock map, or try editing another level. We'll begin by walking you through road creation, and we'll finish up covering advanced topics like light maps and special effects.

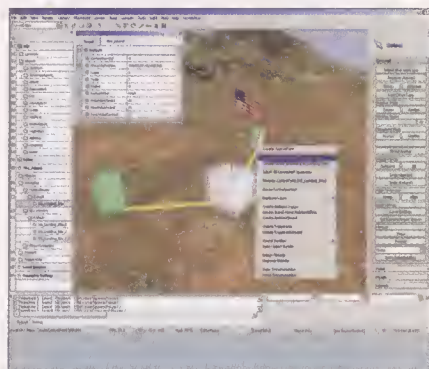
INSIDE THE LEVEL EDITOR



1 Before you can place objects into your freshly created *BF2* map, you need to load them into the editor. You can do this individually or all at once. From the menu select Mod ⇅ Mod Manager then check all the items in the Content Editor tab.



2 *Battlefield 2* revolves around capturing and defending control points. Add points by right-clicking on the ground and selecting Create Control Point. The name you assign the control point is important, as that's the name that will appear on the in-game map.



3 With the control point selected, you can now right-click on the terrain and place spawn points to dictate where the players will spawn in. It's important to place several spawn points at each flag so that attackers cannot predict where defends will spawn in and camp those spots.

"*Battlefield 2*'s user base is crying out for good new maps, so your work here could be in great demand."

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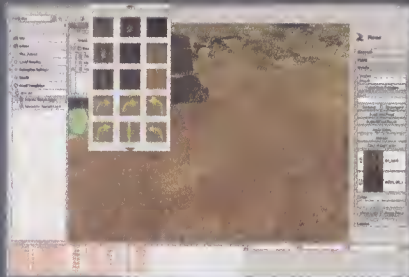
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Caution: road work ahead

If only it was this easy in real life...



1

Create a new road template in the level editor by clicking in the Editor window. Your road will appear in the resource window. Assign primary and secondary textures in the Tweaker bar. You can also adjust settings like width and the texture blending.



2

Press [Alt] + left-click on the terrain to place connection points for your new road. Once you've established the path you want, click on the spline and hit the Connect button in the editor window to assign the template you just created to the road.



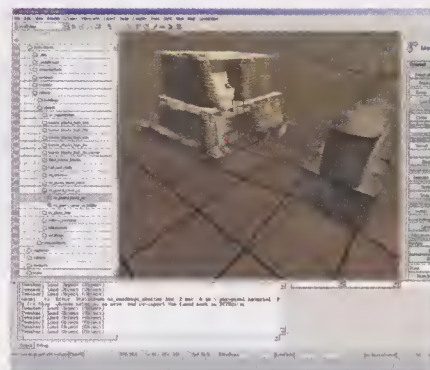
3

Smooth the ground below the road by pressing the Apply Spline button. This will match the contour of the terrain to the path of the spline, permitting vehicles to traverse smoothly. Click Build Final Road to turn the road into a mesh.



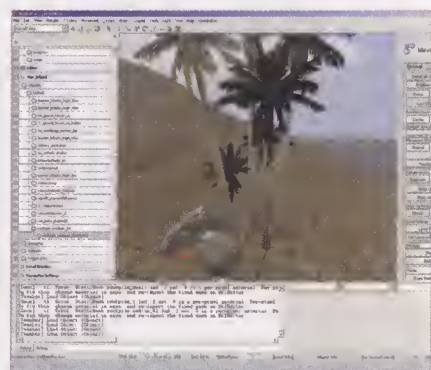
4

Like spawn points, all vehicles and stationary guns must be attached to control points. With the control point selected, right-click on the ground and select Create Object Spawner. You can then select the type of vehicle from a list.



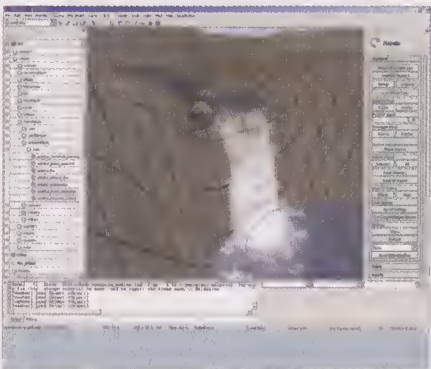
5

Content loaded into the editor is added to the resource tree on the left side. To place objects, drag them onto your landscape. Although objects are categorized, finding specific items can be daunting, but with some practice you'll quickly master the interface.



6

In addition to overgrowth, you can populate your map with individual trees and bushes also by dragging them from the resource tree. To move and rotate objects into position select the appropriate mode from the toolbar then drag the object by the handles that appear on screen.



7

You can drag and drop special items, such as water planes and effects like waterfalls, in exactly the same way as static objects like buildings. When adding particle effects like fire and smoke, be careful not to tilt them as doing so can crash the game.



8

All the static shadows in the game are pre-generated in the editor as lightmaps. Select Compile Lightmaps from the menu to open the lightmap dialogue, where you can choose the rendering quality. Be aware though that a compilation can take hours.



9

Regularly test your map with the game in a window as this displays errors if the game crashes. Create a shortcut to bf2.exe and add +fullscreen 0 to the path, then run the game and select Create Local from the multiplayer menu. From here you can select and test your map.

MORE ON THE BIG BATTLEFIELD 2 PATCH...BECAUSE YOU NEED TO KNOW!

EA usually tests all of its games exclusively in-house. This time, however, it broke with tradition and invited legions of devoted testers from www.bf2combat.net to explore its downloadable Battlefield 2 booster packs while they were still under development.

These booster packs are expansions which offer affordably priced new content. Euro Forces, the first *Battlefield 2* expansion pack, is nothing short of *hawt*, while the second pack, Armored Fury, takes the fight to American soil. It also introduces new maps and aircraft like the A-10 Warthog.

We're hopeful that this new beta policy EA initiated with the booster packs will continue into the future and that they'll use it for other titles. As we saw with the introduction of *Battlefield 2* version 1.2, new patches often break more than they fix. By inviting community testers to participate in a well-executed program, EA repaired hundreds of bugs that might have otherwise prompted a new hot fix.

Starting testing early is critical to successful game development. Testing eliminates devastating errors and improves game balance. By multiplying the numbers of testers and supplying a detached perspective, external communities augment traditional quality assurance (QA) programs. Games are software, and they will never be bug-free, but if more bugs are caught early in the QA cycle, we enjoy more trigger time.



Extensive pre-launch testing reduces the number of patches *Battlefield 2* needs.

Finish off your BF2 map

➤ From ugly duckling to majestic swan in nine steps

STEP 3

During the last two steps, we've progressed through the basics of *Battlefield 2* mapping. In part two we created a functional map by placing vehicles, flags, roads and structures.

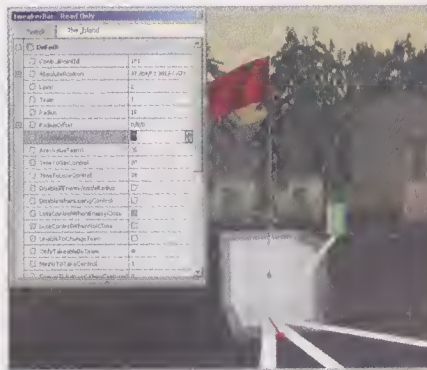
We conclude our series with more advanced mapping techniques. Lighting effects are one of the most important facets of any map. Beware, however, that rendering light maps takes an age; unless you're work-

ing on a supercomputer, make sure you have something else to do while your rig crunches the data. We'll also show you how to pack your map, create custom loading screens, and edit descriptions. Testing your map is also critical. If you are looking for some help with testing we'd recommend *Battlefield 2 Combat: The Battlefield 2 Tour of Duty*, at www.bf2combat.net. It offers free memberships for mappers, and will give you a great opportunity to test out your maps with 64 players.

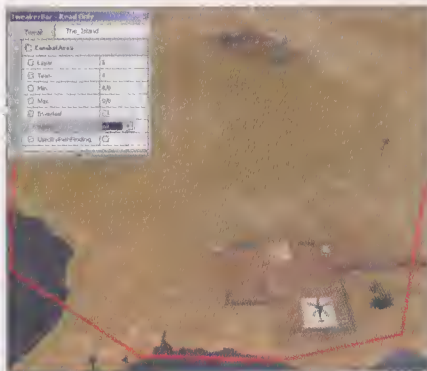
ADVANCED MAPPING TACTICS



1 *BF2* maps come in three sizes: 16, 32 and 64 players. You create layers where objects in each map size appear. When you create control points, vehicle, and player spawns you need to assign them a layer. This enables you to alter the content between sizes.



2 Ticket bleeds are important in *BF2*. They occur when one team owns control points whose area values are equal to or exceed 100. For example, if you want a team to inflict a bleed with three flags, set the Area Value of each control point to 35 in the TweakerBar.

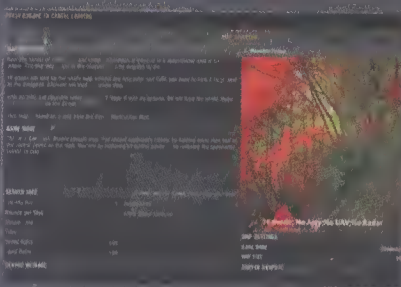


3 The combat area defines the playing boundaries of your map. Select the Combat Area tool in the Level Editor, then draw a line anti-clockwise, by [ALT] + left-clicking the terrain. Put combat areas in your different layers to specify and define different map sizes.

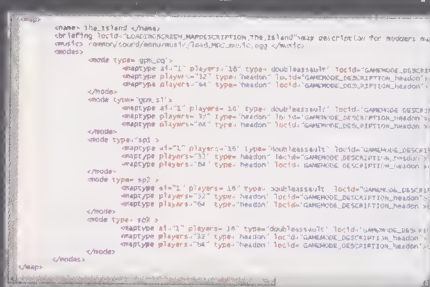


Prepare for battle

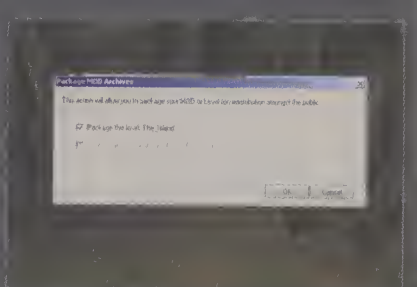
Packing, mini-mapping, and tweaking the description



1 To change the loading screen background you need to place some specific textures in your level's info subfolder. It's easiest to copy the .png files from a stock BF2 map's info folder and then edit them in an image application like Photoshop.



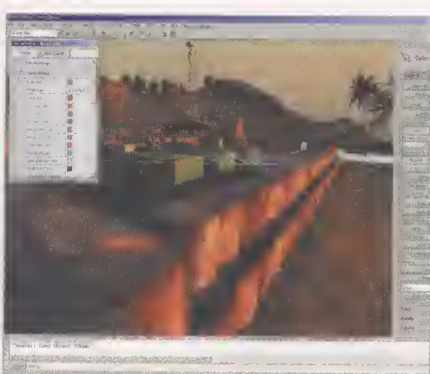
2 To change the verbiage that appears on the loading screen, open /info/mapname.desc in Notepad and replace `LOADINGSCREEN_MAPDESCRIPTION_MAPNAME` with your own description, where MAPNAME is the text that will appear onscreen.



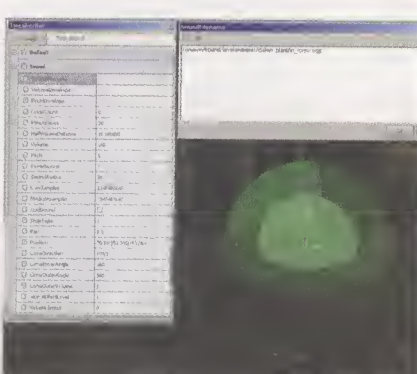
3 To play your completed map with friends, you need to package your msp. Select **Mod** > **Package Mod**, then **Package** this level to compress it. Your release will need to include the files client.zip, server.zip and the info folder in its entirety.



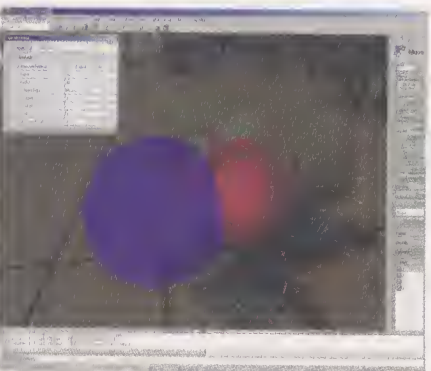
4 Changing sky attributes can have a big effect your map's ambience. Under **Light Settings** in the TweakerBar you can change the sky texture, cloud layer, sun flare and fog parameters. Here we have configured these settings to create a dramatic sunset.



5 In the same tab of the TweakerBar, change the light settings to match your sky settings. We made the sun color orange and we aligned the light direction with the sun in the Sky Texture dialog. Now recompile your lightmaps to see the results of the changes you made.



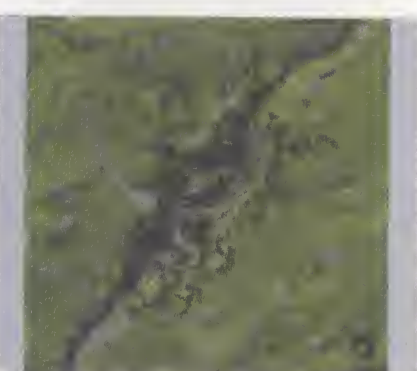
6 Ambient sounds add a dose of atmosphere to each engagement. Right click on the terrain and select **Create Ambient Sound**, from the TweakerBar. You can now select the sound file to play and change parameters such as volume and radius.



7 You can trigger special animations, like frightening a flock of birds when a marine walks nearby, with ambient triggers. To create them, right-click the terrain and place an **Ambient Trigger** and an **Ambient Effect**, then adjust the effect type and trigger radius in the TweakerBar.



8 The hemimap reflects light from the ground onto dynamic objects. To generate the hemimap, select **Compile** > **Make Ground Hemi**. Hemimaps cause substantial changes, as the screen-shot illustrates. Note how the APC is tinged green from light reflecting off the grass.



9 Click **Show Minimap** in the Editor window to create the file minimap.dds in your level directory. If you look in the Hud sub-folder, you will see three textures. Using an image program, you can replace those textures with minimap.dds after scaling it appropriately.

The Payoff

Go to war

Using all you learned, you'll be taking your map online and becoming the hit of the Battlefield 2 community in no time!


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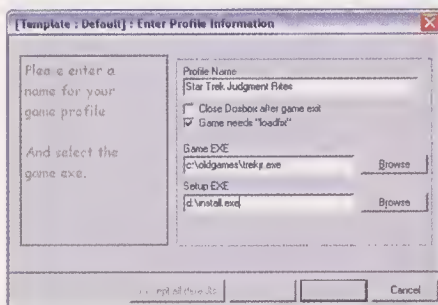
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D-Fend is the most sophisticated front-end available for DOSBox.

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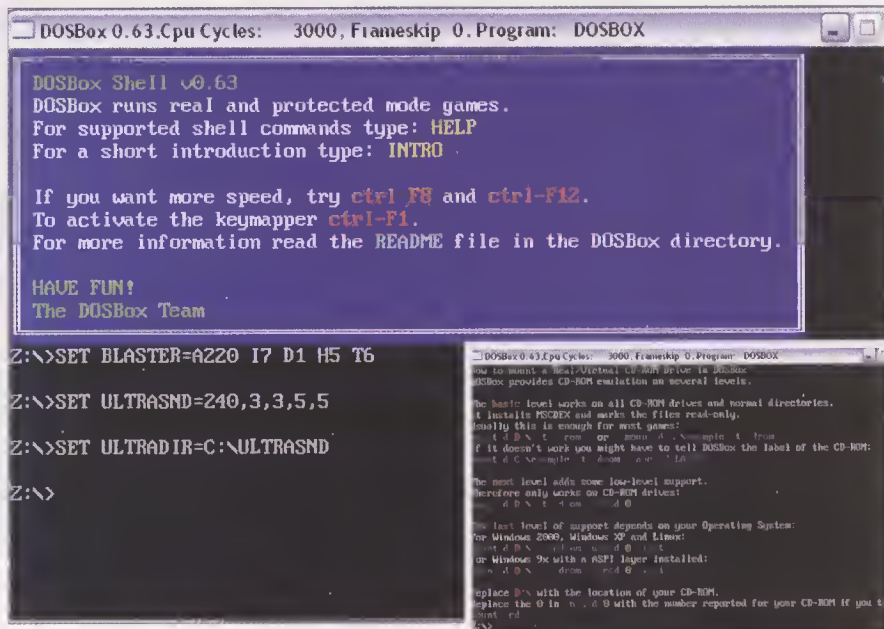
Download the latest version of *DOSBox* from <http://dosbox.sourceforge.net> and install it. Create a new folder—one on the C: drive works best—where you'll install your games; we named ours C:\oldgames. *DOSBox* will mount this directory as a virtual C: drive. Copy any games you want to play to the C:\oldgames folder. You should put each one in a subdirectory, but avoid using names longer than eight characters.

Launch *DOSBox*, then mount C:\oldgames as your C: drive by typing `mount C C:\oldgames`. You should see a Z:\ prompt. Type C: to go to your new, virtual C: drive, and you'll see the contents of your C:\oldgames directory!

If your old game came on CD-ROM, the strategy is a little different. After you launch *DOSBox*, type `mount D X:\-t cdrom` at the command line, where X is your CD-ROM drive letter. If you need help with the syntax, just type `intro cdrom` at the command line.

If the command line is too stressful for you, there's an extra-fancy front-end for *DOSBox* called D-Fend that includes a wizard for setting up *DOSBox* and configuring hard-to-run games. You can download D-Fend for free at <http://members.home.nl/mabus/>.

It's extremely likely that some games are going to give you trouble and require further tweaking. Don't panic—just go to <http://vogons.zetafleet.com/> and check the *DOSBox* forum, where you'll find tips on running just about every classic PC game you can remember.



The return of ye olde command line: *DOSBox* mimics an old-school DOS PC.

DOSBox can install and run your games from CD-ROM.

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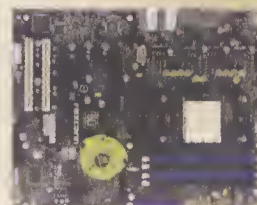
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